

**Planning for Child-Friendly Neighbourhoods in Hamilton: A Case Study Evaluation of the
North End Neighbourhood**

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Abstract

Cities across the globe are experiencing increasing urbanization, and as a result, more and more children and youth are living in urban neighbourhoods. Neighbourhoods can provide opportunities for children to accumulate physical activity, which is one important indicator of healthy child development. However, auto-centric urban planning practices have contributed to an increasing reliance on parents to drive children to their destinations (Torres, 2009), a trend that is reflected in the low rate of Canadian children meeting daily physical activity guidelines (ParticipACTION, 2015). To support the healthy development of children and youth amidst the challenges of increasing urban densities, municipal governments are adopting the concept of *child-friendly cities* to build spaces that protect children's rights to a healthy environment and to embrace policies in the creation of child-friendly neighbourhoods.

The goal of this research paper was to evaluate the child-friendliness of the North End neighbourhood in Hamilton, Ontario to identify the built environment attributes that facilitate, or pose barriers to, children's physical activity. To complete the analysis, this research involved a review of the literature linking the neighbourhood built environment to children's physical activity, semi-structured interviews with key informants, an in-person neighbourhood audit, and a critical analysis of the locally focused planning documents that guide land use and development in the study area. Findings demonstrate that the North End is generally supportive of children's physical activity; however, I identified several limitations of both the existing built environment and the land use policies and guidelines, which informed a set of recommendations to improve the child-friendliness of the neighbourhood overall.

Foreword

This paper fulfills several components of my Plan of Study through its consideration of the intersections between the built environment and related land use planning policies and guidelines, and physical activity as an indicator of health. First, the literature review improved my understanding of the built environment attributes that promote children's physical activity, as well as the best practices regarding how neighbourhoods can be designed to facilitate positive outcomes. This relates directly to learning objectives one and two of the second component of my Plan of Study. This research was underpinned by concepts of healthy child and youth development, independent mobility and sustainability; the conceptual framework section of this review highlights the literature that links these concepts to children's physical activity. This expanded my knowledge of the link between healthy built environments and sustainability in particular, which relates directly to component three of my Plan of Study.

Second, this research utilized a neighbourhood audit of the existing built environment in the North End to identify the opportunities and barriers to children's physical activity within the neighbourhood. The method for this analysis was informed by existing walkability evaluation instruments. This furthered learning objective one of component two by providing an understanding of how to assess neighbourhoods and identify gaps in the existing built environment to inform recommendations on how they might be planned to better facilitate children's physical activity.

Third, this research involved an analysis of the locally focused municipal planning documents to examine the potential impact of the municipal planning framework that pertains to the North End neighbourhood on the creation of built environments that benefit children's

healthy development. This contributed to my understanding of how urban planning policies and guidelines can facilitate development decisions that promote healthy communities, and thus furthered learning objective three of component one of my Plan of Study.

Finally, this paper offers recommendations, informed by the findings from the document analysis and neighbourhood audit, to improve the existing built form and the municipal plans and documents that guide development within the neighbourhood. This directly supports learning objective one of component two by illustrating how to plan for built environments that are facilitative of physical activity.

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Chapter 1: Introduction

Cities across the globe are experiencing increasing urbanization, and as a result, more and more children and youth are living in urban neighbourhoods, which can have a profound impact on their health and wellbeing (Gracey, 2000, 2007; Torres, 2009). Neighbourhoods can provide opportunities for children to accumulate physical activity through active play, independent mobility, and active travel (Oliver et al., 2016). However, auto-centric urban planning practices have contributed to an increasing dependency on parental cars for travel to destinations (Torres, 2009), a trend that is reflected in the low rate of Canadian children meeting daily physical activity guidelines (ParticipACTION, 2015).

To support the healthy development of children and youth amidst the challenges of increasing urban densities, municipal governments are adopting the concept of *child-friendly cities* to build spaces that protect children's rights to a healthy environment. This concept was developed by the United Nations to ensure that "city governments are places where children's rights to a healthy, caring, protective, educative, stimulating, non-discriminating, inclusive, culturally rich environment are addressed" (Riggio, 2002, p. 45). From this perspective, urban planning aims to offer children the opportunity to grow and adapt through their own experiences in their homes, neighbourhoods and the broader community and embraces policies in the creation of child-friendly neighbourhoods to reach all children, not only those identified as at risk (Gill, 2008).

For years, the City of Hamilton’s vision statement has been to be the best place in Canada to raise a child.¹ Children and youth comprise 16.5% of the City’s total population of 536, 917 residents (Statistics Canada, 2017). While the number of children in Hamilton has declined in recent years, population projections suggest that children and youth are among the fastest growing population in the City (Ontario Ministry of Finance, 2017). It is important that the built environment in Hamilton is planned such that it provides opportunities for physical activity for children currently living in the City, and to ensure that the city maintains its attraction to families as it responds to the pressures of urbanization. This paper employs a case study evaluation of the child-friendliness of the North End neighbourhood in Hamilton to identify which attributes of the built environment facilitate, and which pose potential barriers to, children’s physical activity.

1.1 Research Questions

The main purpose of this paper is to answer the following research questions:

- Which features of the North End’s built environment might positively or negatively impact children’s physical activity?
- How do the locally focused planning documents align with the elements of child-friendly neighbourhoods?
- How can the neighbourhood be planned and designed to be more conducive to children’s physical activity?

1.2 Paper Structure

This paper is organized into four chapters. Chapter 2 provides an overview of the existing literature regarding child-friendly neighbourhoods, including the conceptual foundation and a

¹ This vision statement was amended in 2016 to be “the best place to raise a child and age successfully”.

summary of the evidence from prior research linking attributes of the neighbourhood built environment to children's physical activity outcomes. Chapter 3 describes the scope of the research, methods, analysis, and study limitations. Chapters 4 and 5 outline the findings from the neighbourhood audit and document analysis respectively. Finally, Chapter 6 concludes this paper with a summary of the analysis and findings, including a discussion of the challenges and opportunities of the existing built environment and locally focused planning documents to creating a child-friendly North End. The chapter concludes with a set of recommendations for the neighbourhood and opportunities for future research.

Chapter 2: Literature Review

This chapter reviews the existing academic and grey literature on the subject of child-friendly neighbourhoods, with a focus on the attributes of the neighbourhood built environment that influence children's physical activity. The first section of this chapter includes a discussion of the conceptual framework that provides the foundation for this research. The following section provides an overview of the evidence from existing research linking the neighbourhood built environment to children's physical activity-related outcomes, grouped according to seven elements of child-friendly neighbourhoods: density, service proximity, land use mix, street connectivity, streetscape, parking, and housing. For each element, the best practices for planners to achieve an optimal neighbourhood environment for children's physical activity are identified.

2.1 Conceptual Framework

Child-friendly neighbourhoods as a framework is underpinned by concepts of healthy child and youth development, independent mobility, and sustainability. Academic and grey literature linking these concepts to child-friendly neighbourhoods, in combination with the empirical evidence demonstrating associations between the built environment and children's physical activity, provides a conceptual foundation for this research paper.

2.1.1 Healthy Child & Youth Development

Rapid urbanization across the globe is having a profound impact on the health and development of children and youth. Children make up a significant portion of the urban population, with almost half of the world's children living in urban areas (UNICEF, 2012). These urban areas have great potential to provide opportunities for children's physical activity;

however, current patterns of sprawling development have resulted in a phenomenon that Duany, Plater-Zyberk and Speck (2000) refer to as the “cul-de-sac kid”: children who are dependent on adults to drive them to their destinations due to spatial mobility restrictions. Parental concerns about traffic and stranger danger have resulted in children being given a lower degree of autonomy to walk or cycle independently in their neighbourhoods, which has negative implications for their physical activity accumulation (Carver, Timperio, & Crawford, 2008a).

The built environment is consistently recognized among urban planning, geography, sociology, psychology, and public health scholars as important to the healthy development of children and youth, and there is growing evidence of relationships between attributes of the neighbourhood built environment and child health outcomes, including physical activity. Regarding children’s physical activity, the neighbourhood built environment is important for a number of reasons: neighbourhoods are the primary settings for outdoor play, a major source of children’s physical activity, and provide opportunities for inexpensive and unstructured forms of physical activity (Carver, Timperio, & Crawford, 2008b). However, the physical structure of neighbourhoods that is characteristic of conventional suburban development may restrict opportunities for children’s physical activity within the neighbourhood (Committee on Environmental Health, 2009; Frank & Kavage, 2008). For example, low density neighbourhoods with large distances between destinations are widely considered to be adverse environments for physical activity (Frank & Kavage, 2008). While this has consequences for the entire population of urban dwellers, children are more vulnerable to their local environments than adults.

This is due in part to the role that neighbourhoods play as part of children's immediate surroundings (Dunn, Schaefer-McDaniel, & Ramsay, 2010). Researchers argue that children are the "primary consumers of the neighbourhood", as they spend a significant amount of their time outside exploring their neighbourhoods (Dunn et al., 2010, p. 173). For example, Bronfenbrenner's ecological model of child development (1977, 1979, 1986) tells us that the residential context in which a child is embedded has implications for their developmental outcomes: one of the propositions from this model suggests that child development is a function of the developing person, and their experiences and interaction with the environment (as cited in Dunn et al., 2010). Therefore, research with children as the population of interest should not be studied without consideration of neighbourhood as an ecological system in which they operate (Brooks-Gunn, Duncan, Kato Klebanov, & Sealand, 1993).

2.1.2 Independent Mobility

In the existing literature, socioecological models have been used to demonstrate the mechanisms by which the environment might impact physical activity. These models propose that different 'layers' of the environment influence behaviour, including "the individual (e.g., beliefs about physical activity); social factors (e.g., the perceptions and behaviours of siblings or other children and parents); and physical environmental factors (e.g., neighbourhood design)" (Hume et al., 2009, p. 195). Applying this model to children's physical activity highlights the role of these layers of environment, and their relationships with one another, as supportive or disruptive of positive outcomes. This notion is reflected by Broberg, Kyttä and Fagerholm (2013) who purport that "environmental child-friendliness can be defined by two central criteria:

children's possibilities for independent mobility and their opportunities to actualize diverse environmental affordances" (p. 110).

According to this framework, quality built environments incite children to be physically active in part because children are given the independent mobility to access them by their parents. Independent mobility, defined as a license for children to move around independently in their environment, is cited in the literature as an important determinant of children's physical activity accumulation, and is influenced by the presence or absence of environmental affordances (Kytta, 2004, 2006; Oliver et al., 2011.; Page, Cooper, Griew, & Jago, 2010). Environmental affordances, a concept of ecological perceptual psychology, refers to the physical opportunities and constraints that an environment provides (Kytta, 2004). Gibson's (1979) theory of affordances proposes that individuals perceive possibilities for physical activity in an environment by perceiving the affordances of the environment itself (as cited in Clark & Uzzell, 2005). Linking this theory to independent mobility, the degree to which children engage with their physical environment depends on the presence of environmental affordances to facilitate their freedom of movement.

Previous research suggests that different spatial layouts and built environment characteristics offer different opportunities for children's independent mobility (O'Brien, Jones, Sloan, & Rustin, 2000). To assess the child-friendliness of environments, Kytta (2004, 2006) developed a hypothetical model of four types of environments based on the covariation of opportunities for independent mobility and the actualization of environmental affordances. The Bullerby model represents a linear relationship between affordances and independent mobility, and therefore, an ideal environment for children's independent mobility (Kytta, 2006).

According to this model, the more children can move around independently in their environments, the more positive affordances are revealed, and the actualization of these affordances encourages further mobility (Kytä, 2004, 2006; Broberg et al., 2013). Thus in child-friendly environments, perceived environmental affordances facilitate independent mobility.

Auto-centric development patterns have contributed to declining independent mobility rates over time (Oliver et al., 2011) in part because this type of development engineers affordances for children's physical activity out of the physical environment. As this section demonstrates, environmental affordances for physical activity are integral to child-friendly environments. Moreover, the built environment plays an important role in parents' decisions to grant their children the license of mobility (Alparone & Pacilli, 2012; Prezza et al., 2001) and as a result, the amount of physical activity that children accumulate via playing, walking and cycling throughout their neighbourhoods. Therefore, attributes of child-friendly neighbourhoods can be seen as environmental affordances for independent mobility and consequently, physical activity.

2.1.3 Sustainability

The concept of child-friendly cities can be linked to both environmental and urban social sustainability. With respect to the former, researchers have drawn parallels between the principles of environmental sustainability and those of child-friendly neighbourhoods, arguing that the ability of the built environment to facilitate children's physical activity is indicative of the neighbourhood's environmental sustainability overall. For example, previous sections in this chapter state that the decrease in children's independent mobility and consequently, physical activity, may be due in part to the changing nature of transportation and increasing time spent

being chauffeured by parents. The trend towards reliance on private automobiles as the primary mode of transportation constrains pro-environmental travel mode options (Johansson, 2003), and threatens the sustainability of public transport systems (Kytä, Hirvonen, Rudner, Pirjola, & Laatikainen, 2015).

The attributes of child-friendly neighbourhoods are also consistent with the principles of urban social sustainability. According to Seasons (2004), urban social sustainability is “a process of urban development, supported by policies and institutions that ensure harmonious social relations, enhance social integration, and improve living conditions for all groups” (p. 22). This framework implies that neighbourhoods should fulfill the needs of present and future generations; thus for neighbourhoods to be sustainable, they must support the needs of all citizens, including children and youth (Yiftachel & Hedgcock, 1993; Seasons, 2004). However, urban planning policies and practices have historically assumed a single public interest. Rather than being regarded as citizens of the present, children are often viewed as the beneficiaries of today’s planning decisions (Tranter & Pawson, 2001), and have been largely excluded from urban planning processes (Bridgman, 2004).

This approach to planning has resulted in policies and practices that do not adequately address the needs of children and youth (Schultz, 2010; Torres, 2009). The implications of this adult-centrism are illustrated by the traditional suburban development patterns that have resulted in auto dependency and a general unfriendliness towards modes of active transportation common among children and youth (Torres, 2009). This development pattern further reinforces the role of parents and other adults as gatekeepers to children’s spatial mobility. However, the concept of socially sustainable urban development challenges these

platitudes: from this perspective, children are viewed as citizens of today rather than citizens of tomorrow. Therefore, under an urban social sustainability framework, planning policies and practices break down barriers between ‘adult’ and ‘child’ to enhance the equity needed for sustainability (Maxey, 1999).

2.2 Elements of a Child-Friendly Built Environment

In this section, I identify seven core elements of child-friendly neighbourhoods that apply to urban planning, and describe the attributes of the neighbourhood built environment that correspond with each element. Broadly, this review demonstrates that the physical features of child-friendly neighbourhoods are those that facilitate active play, travel and exploration; provide access to child-specific destinations; and offer children the opportunity to be safe and active in the public realm. The following describes these elements of child-friendly neighbourhoods and the mechanisms that link each element to children’s physical activity in greater detail.

2.2.1 Density

Density is most often measured in terms of the number of people, jobs, services, buildings, or dwellings within a specific area. This feature of the built environment is an indicator of walkability, and higher densities are generally equated with greater opportunities for active travel. Residential density is the most frequently cited measure of density in the literature linking the built environment to children’s physical activity. Several studies have found positive associations between residential density and walking, cycling, and physical activity (Carlson et al., 2015; de Vries, Bakker, Van Mechelen, & Hopman-Rock, 2007; van Loon, Frank, Nettlefold, & Naylor, 2014; Verhoeven et al., 2016); and a negative effect of residential

density on BMI (Duncan et al., 2014; Slater et al., 2010; Spence, Cutumisu, Edwards & Evans, 2008).

On the one hand, low-density neighbourhoods have been linked with poor outcomes, in part because this pattern of land use increases reliance on automobiles, and lowers the degree to which children are given the freedom to travel around their neighbourhoods without adult supervision (Tranter & Whitelegg, 1994). The result is a phenomenon that Duany et al. (2000) refer to as the “cul-de-sac kid”, children who are dependent on an adult to drive them to their destinations. This restriction has been linked with negative consequences for children and youth including increased exposure to the dangers of automobiles and increased risk of sedentary behaviours (Gleeson & Sipe, 2006). For example, Duncan et al. (2014) examined the association of several characteristics of walkable built environments with change in children’s BMI over time to find that children living in neighbourhoods with lower residential density saw a greater increase in BMI z-score compared with those living in areas with higher residential density, after adjusting for child’s age, sex, race/ethnicity, and neighbourhood mean household income.

On the other hand, compact density facilitates positive outcomes by providing greater access to local destinations, and thus increased opportunities for children and youth to use active travel within their neighbourhoods (Giles-Corti, Kelty, Zubrick, & Villanueva, 2009). The conditions of higher density neighbourhoods also contribute to a greater license for children’s independent mobility which impacts physical activity accumulation (Oliver et al., 2011, 2016). For example, a cross-sectional study of ten neighbourhoods in the Netherlands demonstrated a significant positive association between residential density and physical activity among children

6-11 years of age, after adjusting for child age, sex, BMI, and maternal education (de Vries et al., 2007). Carlson et al. (2015) also demonstrated a link between residential density and physical activity, and found that for every 10 more housing units per parcel in the one kilometre participant buffer, walking among teenagers increased by 40%.

Children and youth living in dense neighbourhoods are likely to be within walking or cycling distance of the destinations that they use on a regular basis. Therefore, child-friendly communities should be dense and compact, with a walkable distance between amenities to encourage active transportation (City of Surrey, 2009). Other practices to promote density include: reduced lot sizes, a mix of higher-density structure types, parking maximums, and a compact grid-pattern street network (City of Surrey, 2010; Enns, 2014; The Planning Partnership, 2011).

When considering these recommendations, it is important to note that density can result in negative outcomes for children and youth; very high residential densities are associated with constrained play geographies and travel range of children and youth (Oliver et al., 2011) which has implications for their physical activity. For example, Jones, Davis and Evers (2000) found that children were less likely to travel independently in the high-density urban area characterized by multi-story apartment block neighbourhoods, when compared to suburban or rural areas. This may be attributed in part to the increased traffic density that corresponds with high residential density, which impacts parents' safety concerns, and consequently, children's independent mobility (Mecredy, Pickett & Janssen 2011a). Therefore, higher density neighbourhoods should not be planned for in isolation of other elements that protect children from the negative health effects of traffic, and as a result, improve parents'

perceptions of the safety of the neighbourhood environment. Strategies to counteract the negative impacts of increased traffic density will be explored throughout this chapter.

2.2.2 Service Proximity

Service proximity refers to the distance between where people live and everyday services and destinations including public transit, neighbourhood community and retail services, and employment (The Planning Partnership, 2011). It is most frequently measured as objective or perceived walking, cycling or travel distance to a given destination from one's home, and has a strong influence on whether people choose active or passive modes of transport. Proximity and access to destinations that children and youth visit frequently is particularly important to their physical activity. For example, access and proximity to the nearest recreational space (de Vries et al., 2007; Duncan et al., 2014; van Loon et al., 2014), school (van Loon et al., 2014; Oreskovic, Winickoff, Kuhlthau, Romm, & Perrin, 2009), park (Mitchell, Clark, & Gilliland, 2016; van Loon et al., 2014) play area (Tappe, Glanz, Sallis, Zhou, & Saelens, 2013), public transit stop (Roberts, Knight, Ray, & Salens, 2016), and library (Singh, Siahpush, & Kogan, 2010) has been shown to be significantly associated with children's physical activity outcomes.

Oliver et al. (2015) focused on access to child-specific destinations in a study of the relationship between attributes of the built environment and the frequency of moderate-to-vigorous physical activity and active travel in a group of children residing in Auckland, New Zealand. Destination accessibility was measured using the child-specific neighbourhood destination accessibility index (NDAI-C), which includes 35 destinations that children regularly visit. These destinations include education facilities, transport services, recreation spaces, social

and cultural services, food retail locations, financial services, health services, and other retail locations. While findings demonstrated temporal variation in the relationship between access to child-specific destinations and the activity outcomes, Oliver et al. (2015) found a significant positive association between the NDAI-C score and proportion of trips made by active mode(s) outside of school hours.

To ensure that child-specific destinations are located in close proximity to the home, communities should provide for a mix of uses that support non-motorized travel (Gilbert & O'Brien, 2005). This can be achieved by setting maximum distances to services from residential areas (The Planning Partnership, 2011). However, it is important to again consider the role that route safety plays in destination accessibility. Services must not only be located in close proximity to the home; communities should also be designed so that schools, parks and play spaces are safe for children to access independently by foot and bicycle (City of Surrey, 2010; Honey-Ray & Enns, 2009). Creating safe routes to children's destinations may facilitate children's physical activity, partly by promoting the perception that children are able to use active modes of travel without adult supervision (Villanueva et al., 2013). The following sections of this review will discuss the potential for other attributes of the built environment, including aesthetics and street design, to achieve this objective.

2.2.2.1 Parks and Open Spaces

This element refers to the proximity of parks and open spaces. Play is known to be an important source of physical activity among children and youth. As I will describe in the 'streetscape' section of this review, a child-friendly neighbourhood should provide ample opportunities for children to engage in play. Designing the public realm to enable children to

play freely throughout their neighbourhoods is an important measure to achieve this objective. However, unstructured play that occurs exclusively in parks and open spaces must also be considered, given its importance as a resource for children's physical activity. By providing access to a variety of sports and recreation infrastructure, the built environment of parks and open spaces encourages active play outdoors (Duranceau & Bergeron, 2013).

The proximity of parks to children's homes has important implications for whether the spaces are utilized, and consequently their ability to facilitate activity among children and youth. This is important as most of children's exercise takes place in parks and playgrounds (Cooper & Murphey, 2014), and the existing literature reveals a significant positive association between proximity of neighbourhood parks and recreational infrastructure to the home and children's physical activity levels. For example, a study by Roemmich et al. (2006) of the association of the neighbourhood environment with children's physical activity found that a greater proportion of park and recreation areas present within the neighbourhood was associated with greater physical activity among children 4 to 7 years of age. Neighbourhoods should be designed such that parks and open spaces are located within a walkable distance of residential areas, and therefore easily accessed by children (City of Surrey, 2010).

2.2.3 Land Use Mix

Land use mix is most frequently defined in the literature as the proportion of different land uses in a given area, and is often used as a measure of neighbourhood walkability. This element reflects the distance between and range of services, institutions, and amenities (The Planning Partnership, 2011). Land use mix impacts children's physical activity by determining the degree to which services and other destinations are accessible within the neighbourhood

via an active mode of travel, specifically those that are used by children daily. Greater heterogeneity of land uses means greater accessibility to services and destinations near residential areas, therefore these environments are more conducive to walking or cycling for transportation than environments with more homogenous land uses.

When included in a walkability index with other built environment features, land use mix was found to be inversely associated with sedentary activity among youth (Laxer & Jannsen, 2013). In a cross-sectional study of the association between several built environment features and physical inactivity among Canadian youth, Laxer and Jannsen (2013) found that youth living in the least walkable neighbourhoods had a 28-44% higher risk of physical inactivity compared to youth living in more walkable neighbourhoods, after adjusting for individual- and neighbourhood-level covariates. Comparatively, Verhoeven et al. (2016) studied the relationship between psychosocial and environmental factors and active and passive transport among older adolescents to school and other destinations, and found a negative association between adolescent-perceived land use mix access and the use of public transport to school (versus an active mode of travel). However, Verhoeven et al. (2016) explain that this may be because walking and cycling are not the preferred methods of transport in areas with lower land use mix.

Walking to school is among the most common forms of physical activity for children and youth; thus, the route from home to school represents an important opportunity to increase the frequency of children's physical activity on a daily basis (Larsen, Gilliland, & Hess, 2012). However, in a route-based analysis of the environmental influences on children's active travel to school, Larsen et al. (2012) found that more mixed land uses in the travel corridor (based on

the shortest distance between a child's home and school) decreased the odds of a student actively commuting to school. This finding contradicts the notion that land use mix is conducive to children's physical activity; however, Larsen et al. (2012) argue that future research needs to examine this finding further, as the entropy value used to define land use mix is a coarse measure, and may not accurately capture this variable and its influence on children's active travel to school.

Despite these inconsistent findings, practitioners recommend a mix of land uses in the development of child-friendly neighbourhoods (City of Surrey, 2009, Gilbert & O'Brien, 2005). While there is no ideal land use mix specified in the existing literature, mixed-use zoning can help to provide for a variety of uses (Honey-Ray & Enns, 2009). Moreover, other elements of child-friendly cities including service proximity and density complement land use, therefore standards to achieve high density and the clustering of services around residences can help to achieve a desirable land use mix for child-friendly spaces (The Planning Partnership, 2011).

2.2.4 Street Connectivity

Street connectivity refers to the route directness and density of connections in the road network, and is often measured in terms of intersection density, road length, cul-de-sac density, and block size (Mecredy, Janssen, & Pickett, 2011b; The Planning Partnership, 2011). Generally, low street connectivity is characterized by a looping street pattern and large blocks, whereas high street connectivity is characterized by small blocks with a compact grid-based network of streets (Mecredy et al., 2011b; The Planning Partnership, 2011). High street connectivity makes it easier to walk or cycle between destinations via route directness, shorter route distances, and a variety of route options (Mecredy et al., 2011a). Comparatively, low

connectivity discourages active travel and encourages the use of automobiles because of large distances between destinations, higher traffic volumes, and fewer route options which result in unpleasant environments for pedestrians (The Planning Partnership, 2011).

High intersection density, a measure of the proportion of intersections in a given area, and small block size are key characteristics of connected streets, and are often included in a composite measure of street connectivity. Several studies indicate positive associations between these factors and children's physical activity (Boone-Heinonen, Popkin, Song, & Gordon-Larsen, 2010; van Loon et al., 2014), frequency of walking and cycling (Carlson et al., 2015; Carver et al., 2008a; Carver, Timperio, Hesketh, & Crawford, 2009;) active travel (Larsen et al., 2012; Oliver et al., 2015); and negative associations with physical inactivity (Laxer & Janssen, 2013); obesity, overweight and BMI (Duncan et al., 2014; Slater et al., 2010; Spence et al., 2008). While physical activity, weight and active travel are the outcomes of interest in most studies, Mecredy et al. (2011b) linked street connectivity with students' reports of injuries occurring in the street. Study findings demonstrate that Canadian students living in the low versus high street connectivity neighbourhoods may experience higher odds of street injury as pedestrians (Mecredy et al., 2011b).

To improve street connectivity for child-friendly neighbourhoods, emphasis should be placed on providing a fine-grained street network with short blocks to avoid auto-oriented development patterns, and promote pedestrian circulation (City of Surrey, 2010). The street network should be connected by pedestrian and cycling pathways and cut-throughs to make it easy and safe to use active travel to destinations, particularly to those that children visit frequently (e.g., schools, libraries, and parks and open spaces) (Timperio et al., 2010).

Additional measures to make the active transportation network safe and accessible are detailed in the following section on streetscape.

2.2.5 Streetscape

Streetscape represents the physical appearance of public spaces. A well-designed streetscape impacts physical activity through the creation of safe, accessible and visually appealing spaces that facilitate ease of travel by foot or bicycle. For example, streets that are built to pedestrian scale, that are visually interesting, and that offer a safe environment for pedestrians generally encourage active travel; whereas wide streets with few pedestrian amenities are more efficient for automobile movement (The Planning Partnership, 2011).

Existing research demonstrates a number of streetscape characteristics that impact the healthy development of children and youth. The streetscape's ability to facilitate pedestrian movement is determined by a) aesthetics and built form; and b) road network and sidewalk characteristics. The first streetscape component, aesthetics and built form, includes features such as building orientation and setbacks, street trees, and amenities including lighting, street furniture, and public art. Several studies have demonstrated associations between these features and physical activity (de Vries et al., 2007; Tappe et al., 2013), active travel (Larsen et al., 2012; Dalton et al., 2011); and overweight and obesity (Nelson & Woods, 2009). While there is insufficient evidence to suggest a link between human scale and children's physical activity, there is literature indicating human scale as a determinant of neighbourhood walkability (Ewing & Handy, 2009). Therefore, neighbourhoods built to pedestrian scale and with many amenities are conducive to children's physical activity by creating a more pleasant environment for pedestrians.

The second component of this element, road network and sidewalk characteristics, includes traffic calming measures, sidewalk width, traffic speed and volume, and traffic directionality. In the existing literature, the presence of traffic calming measures such as speed humps and road narrowings were positively associated with physical activity (Carver et al., 2008a; Carver et al., 2009), walking/cycling frequency (Carver et al., 2008a), and negatively associated with vehicle-pedestrian collisions among school children (Rothman, Mcarthur, To, Buliung, & Howard, 2014); higher traffic speed and volume was negatively associated with physical activity (van Loon et al., 2014; de Vries et al., 2007) and active travel to school (Helbich et al., 2016); one-way streets were associated with increased vehicle-pedestrian collisions (Rothman et al., 2014); wider sidewalks were positively associated with active transportation to school (Gropp, Pickett, & Janssen, 2012), and negatively associated with physical inactivity (Laxer and Janssen, 2013), and BMI, overweight, and obesity (Duncan et al., 2014, Nelson & Woods, 2009; Singh et al., 2010); and the presence of bicycle lanes contributed positively to physical activity (de Vries et al., 2007), active travel to school (Helbich et al., 2016) and reduces BMI (Nelson & Woods, 2009) and time spent being sedentary (Weimann, Bjork, Rylander, Bergman, & Eiben, 2014).

Research by Oliver et al. (2015) captures the impact of both the aesthetic and road network characteristics of the streetscape on children's active travel and physical activity outside of school hours. In this study, streetscape was measured in terms of several features that reflect whether the physical environment is pleasant for walking and cycling, and was positively associated with children's out-of-school moderate-to-vigorous physical activity on

weekdays (Oliver et al., 2015). This evidence suggests that safe and aesthetically-pleasing streetscapes are important for children and youth as participants in the public realm.

There are several best practices and recommendations to achieve a well-designed streetscape for child-friendly environments. First, neighbourhood streets and public spaces should include amenities such as trees, street furniture, and lighting (City of Surrey, 2010; Enns, 2014). Clear markings and wayfinding signage are also important to help children navigate their neighbourhoods (City of Surrey, 2009). Buildings should be oriented to pedestrian activity, constructed close together and to the sidewalk (Yates, Harrison & Rintoul, 2016; Enns, 2014). Practitioners should also endeavour to improve the safety of the public realm by implementing Crime Prevention Through Environmental Design Principles (CPTED) (City of Surrey, 2010; Enns, 2014). CPTED include urban design principles that are believed to reduce crime and the fear of crime by facilitating natural forms of surveillance (CPTED Ontario, 2014). For example, lighting should be strategically located along pathways to enhance the visibility of pedestrians at night (CPTED Ontario, 2014).

Streetscapes should also provide ample opportunities for children of all ages and abilities to engage in unstructured play in their neighbourhoods. According to the New South Wales Department of Health (2009), children need “opportunities for unstructured, imaginative and adventurous outdoor play in their local neighbourhoods, and not just via fixed equipment playgrounds” (p. 99). This assertion is supported by findings from a study that identified the characteristics of the built environment that are important to children’s play. In a study of the social and physical characteristics of child-friendly environments, Karsten and van Vliet (2006) state that play space is one of several physical conditions that urban families see as important

for their children, and is among the characteristics that make an ideal “child street”. To achieve this, design elements that facilitate unstructured play (e.g., coloured sidewalks, benches, etc.) and public art that promotes interaction and play among young audiences should be incorporated into the streetscape (City of Surrey, 2010).

To protect children from vehicular traffic and encourage active modes of travel, neighbourhoods should be designed to prioritize pedestrian and cyclists over vehicular movement, particularly along routes to children’s everyday destinations. Traffic calming measures such as speed humps, road narrowings, reduced road width, lower maximum traffic speeds, and clearly-marked pedestrian crossings should be implemented to protect walking and cycling routes (Alberta Centre for Child, Family and Community Research, 2015; Enns, 2014; Gilbert & O’Brien, 2005; ParticipACTION, 2015). Consideration should also be given to the needs of children and their families when designing sidewalks and walking paths. Sidewalks should be wide enough to accommodate children on bicycles and strollers, and to avoid proximity to heavy traffic along major roads (Gilbert & O’Brien, 2005). Ramps and curb-cuts should be located at road crossings or where there are changes in grade to enable strollers and mobility devices to access sidewalks easily (Alberta Centre for Child, Family and Community Research, 2015; Gilbert & O’Brien, 2005). Buffers between the sidewalk and street (e.g., grass strips) should also be implemented to separate traffic from pedestrian pathways (Enns, 2014). Bicycle paths should be incorporated into the active transportation network, ideally separated from pedestrian and automobile traffic via dedicated bike lanes (Enns, 2014). The neighbourhood should also feature bicycle-friendly facilities including bicycle parking at key destinations (Honey-Ray & Enns, 2009).

2.2.6 Parking

This element refers to both automobile and bicycle parking. Parking can have a negative impact on proximity to services, density and aesthetic of the public realm; and provides little incentive to use active modes of travel if offered in abundance (Dunn, Creatore, Peterson, Weyman, & Glazier, 2009; The Planning Partnership, 2011). Parking in child-friendly neighbourhoods aims to discourage the use of private automobiles for transportation, and encourage walking and cycling. Evidence linking automobile parking to child-specific outcomes is limited; however, findings from a study by de Vries et al. (2007) demonstrate a positive association between the frequency of parallel parking spaces in a neighbourhood and children's physical activity. Parallel parking spaces may be a determinant of child pedestrian safety by reducing the speed of motorists and creating a barrier between the street and children's play areas, thus impacting their likelihood of engaging in physical activity outdoors (de Vries et al., 2007). Automobile parking characteristics have also been shown to contribute to child pedestrian driveway runover injuries. Findings from a study of the impact of built environment characteristics on driveway runover injury demonstrated a significant positive association between the number of surface parking areas on residential properties and risk of injury (Shepherd, Austin, & Chambers, 2010).

This evidence suggests that the design and location of parking have important implications for children's physical activity. However, automobile parking is an important amenity, especially to residents and businesses (The Planning Partnership, 2011). Measures should be implemented to discourage reliance on private automobiles and promote alternative modes of transportation without eliminating parking entirely; for example, reducing the supply

of automobile parking in surface lots while increasing on-street parking and the supply of bicycle parking and storage (Gilbert & O'Brien, 2005; The Planning Partnership, 2011). To eliminate barriers to cycling among children specifically, bike racks and storage should be placed near spaces that children visit frequently, including schools, libraries, parks, and transit stops (City of Surrey, 2010; Gilbert & O'Brien, 2005; Honey-Ray & Enns, 2009). Improved accessibility to safe modes of active travel to children's destinations, and decreased accessibility of automobile parking, would decrease the reliance of children on adult drivers, improve independent mobility, and as a result, provide more opportunities for physical activity.

2.2.7 Housing

This element refers to housing type, location and design. Housing is linked to children's physical activity through elements including density, land use mix, and service proximity. Residential areas should be compact, located within close proximity of destinations that children visit frequently, and include a variety of housing types (Alberta Centre for Child, Family and Community Research, 2015; City of Surrey, 2010; Enns, 2014; Furlong & Cunningham, 2007). Large lot single-detached homes should be limited, as this type of housing is associated with decreased odds of children actively commuting to school (Larsen et al., 2012).

There are also several design elements that should be incorporated in housing development to promote child-friendliness. First, development should integrate CPTED and "eyes on the street" mechanisms to provide for informal surveillance of outdoor spaces within residential areas (City of Surrey, 2010; Enns, 2014). For example, a semi-private "buffer zone" between family private space and public space such as a porch (Cooper & Sarkissian, 1986), low landscaping, low open fences, and street furniture, and lighting (City of Mississauga, 2014).

Development should also include dedicated outdoor play areas where possible (Alberta Centre for Child, Family, and Community Research, 2015; Cooper & Sarkissian, 1986). Housing areas that feature safe and accessible parks, playgrounds and open spaces are important to children's physical activity, particularly in areas with very high dwelling density wherein play geographies and indoor play opportunities are more limited (Oliver et al., 2011).

2.3 Summary

This chapter provides an overview of the conceptual frameworks that underpin the concept of child-friendly neighbourhoods, and presents evidence of the associations between features of the neighbourhood built environment and children's physical activity. The existing research shows that the built environment impacts children's physical activity either directly by providing opportunities for safe play and active travel within the neighbourhood, or indirectly by influencing children's independent mobility. Attributes of child-friendly neighbourhoods are positive affordances for independent mobility, an important determinant of children's physical activity accumulation (Oliver et al., 2011, 2016). Seven key elements of child-friendly neighbourhoods were identified: density, land use mix, service proximity, street connectivity, streetscape, and housing. An objective of this research is to determine how a neighbourhood in Hamilton, Ontario performs in terms of its child-friendliness. These seven elements informed the development of the analytic tools that were used in the neighbourhood audit and document analysis stages of this research to assess the child-friendliness of the North End. The following chapter describes these methods in greater detail.

Chapter 3: Methodology

This research paper seeks to evaluate the child-friendliness of the North End neighbourhood in Hamilton, Ontario. The purpose of this chapter is to describe the methodology that was used to achieve this objective. The research methods are qualitative in nature, and I employed four different sources of evidence to triangulate the data gathered, including a literature review, key informant interviews, neighbourhood audit, and document analysis. The following describes this methodology in greater detail, including the purpose and execution of each method, how the data collected from each source were analyzed, study limitations, and ethical considerations.

3.1 Case Study Method

I selected a qualitative case study method to provide a comprehensive understanding of child-friendliness as a phenomenon in a real-world setting (Baxter & Jack, 2008; Yin, 2014). Moreover, a case study approach enabled me to assess this phenomenon through multiple lenses. To ensure that my point of view was not the only perspective considered in this study, I integrated multiple data sources into the analyses. This study took a descriptive approach to the case method of analysis, as the purpose of the research is to *describe* the phenomenon rather than develop an explanation for its occurrence (Baxter & Jack, 2008; Yin, 2003). Accordingly, this method enabled me to explore the concept of child-friendliness in a deeply descriptive manner.

3.1.1 Neighbourhood Selection

To manage the scope of the study, I selected a single-case study approach. The North End was chosen because of its demographic composition and anticipated growth. A significant proportion of North End residents are between the ages of 0 and 14, and the neighbourhood has a higher proportion of children than Hamilton overall (17.8% vs. 16.7%) (Statistics Canada, 2012). Moreover, the number of children per family in the North End is higher than the average for Hamilton (Statistics Canada, 2012), and the neighbourhood is expected to experience substantial growth in the coming years. Approximately 1500 residential units and 13,000 square metres of commercial and institutional space will be added with the development of Pier 8 along the harbour front (City of Hamilton, 2017b). Evaluating this neighbourhood explores how well it is currently serving the needs of its many children, and how it will serve the needs of children in the future as the neighbourhood continues to grow.

3.2 Data Collection & Analysis

This research employed four different qualitative methods to examine the child-friendliness of the neighbourhood from multiple points of view (Gibson & Brown, 2009) and avoid researcher bias (Yin, 2003). First, I reviewed the literature regarding the concept of child-friendly cities, and the relationship between attributes of the built environment and children's physical activity to highlight the attributes that contribute positively to the outcome. Second, I conducted semi-structured interviews with key informants from the City of Hamilton to supplement and clarify information gathered from the literature review and support the development of the analytic criteria used in the proceeding research stages. I then performed an in-person audit of the neighbourhood built environment using a structured rating tool. Finally, I analyzed locally relevant planning documents to assess how the elements of child-

friendly built environments are embedded in the plans and policies that guide land use and development in the neighbourhood. The following describes these methods in greater detail, and outlines how data collected from each stage of research was analyzed.

3.2.1 Literature Review

The intent of this paper is to examine and describe the child-friendliness of the North End by identifying the opportunities and barriers to children's physical activity in the neighbourhood. Chapter 2 outlines the conceptual foundation for this work, and ideas of the role of the built environment in children's physical activity outcomes. I obtained literature from scholarly, governmental and organizational databases by searching key words such as 'children and youth', 'physical activity', 'built environment', 'planning', 'child-friendly cities', 'neighbourhood child-friendliness' etc. and included a variety of sources including peer-reviewed journal articles from the disciplines of urban planning, geography, public health, and epidemiology; and grey literature such as government and non-governmental reports, including documents from other municipalities. The literature gathered from this review informed the development of a set of 'child-friendly' criteria against the city's planning documents were analyzed, as well as the neighbourhood audit tool. To ensure relevance of the information gathered, the review focused on literature produced in North America within the last 10 years, but did not exclude literature published prior to this date based on relevance to the present study.

3.2.2 Semi-Structured Interviews

The second phase of this research paper was to conduct semi-structured interviews with key informants from the City of Hamilton Planning and Economic Development and Public

Health departments. I used the information gathered from these interviews supplement and verify information gathered from the literature review, to inform the evaluation criteria employed in the neighbourhood audit and document analysis, and to gain insight into how the needs of children and youth are considered in the development of planning documents in the Hamilton context. I selected a purposeful sample of two key informants based on their experience either with developing planning documents, or with applying the policies and guidelines found in these documents in practice.

I initially requested interviews through email. Once the interview data and location was confirmed, a list of interview questions was emailed to the interviewee. I developed the interview questions using a semi-structured approach, and compiled them in an interview guide, which was adapted from the work of Schultz (2010), who completed a similar analysis of Surrey's City Centre Plan Update (refer to Appendix A).² Interviews lasted between 90 and 120 minutes. While the sample of key informants was small, I achieved saturation; information provided by the interviewees was repeated, and I gained no new insight after the second interview (Hoggart, Lees & Davies, 2002).

3.2.3 Neighbourhood Audit

The third component of this research was an in-person audit to assess the existing neighbourhood built environment. To complete the neighbourhood audit, I developed a

² The interviews were originally intended to support an analysis of the child-friendliness of all municipal planning documents, which is reflected in the questions included in the interview guide. I decided to narrow the scope of the research following completion of these interviews, therefore only some of the responses were applicable to this research paper, and responses were used primarily to inform the analytic criteria for the neighbourhood audit and document analysis.

structured rating tool (refer to Appendix B). The tool was adapted from the Built Environment and Active Transportation (B.E.A.T.) Neighbourhood Assessment tool by EcoPlan (2009) to include additional elements that impact children's physical activity identified in the literature review and key informant interviews. The criteria included in the rating tool are grouped to align with the analytic categories that are used in the document analysis. Each criterion is assigned a quantitative value ranging from 0 to 2, which neighbourhood features are scored against. The six categories³ and 38 individual criterion add up to possible value of 69.

The geographic limits for this audit were defined by the City of Hamilton neighbourhood boundaries, which are coterminous with census tract 66.00 (Statistics Canada, 2017). The North End is bound by Wellington Street to the east, Strachan Street East to the south, Canada National Rail to the west, and the Hamilton Harbour front to the north (refer to Appendix C). I conducted a one-day site visit on May 20, 2017 to complete the neighbourhood audit. During the site visit, a walking survey of the neighbourhood was completed wherein I walked along the predetermined neighbourhood route while taking photographs and recording comprehensive field notes of my observations relating to each rating tool criterion. The route included all major and approximately 75% of the minor roads within the neighbourhood boundaries. A map of the neighbourhood audit route can be found in Appendix D. Following completion of the site visit, I evaluated my observations against the tool, and assigned a numerical value to each criterion.

3.2.4 Document Analysis

³ Note that only six of the seven elements that were identified in the literature review were included. Specific features that pertain to child-friendly housing were incorporated into the land use mix, service proximity and density elements of the neighbourhood audit and document analysis.

In the final phase of this research paper, I analyzed four locally focused municipal planning documents. The document analysis considered how the characteristics of a child-friendly neighbourhood, with respect to the physical environment, are embedded in the documents that shape land use and development in the North End neighbourhood. Documents assessed in this analysis are described below:

1. ***West Harbour Setting Sail Secondary Plan***: The Secondary Plan for the West Harbour planning area was adopted by City Council on March 23, 2005 and approved by the Ontario Municipal Board on December 27, 2012. The document provides guidance for planning, zoning and development decisions in the area bound on the north by the Hamilton Harbour, on the east by Wellington Street, on the south by Cannon Street and on the west by York Boulevard. To supplement the information regarding land use designations as specified in the plan and consequently, permitted uses in the neighbourhood, I also consulted the *City of Hamilton Zoning By-Law No. 6593*.
2. ***North End Traffic Management Plan***: This document was produced in 2008 following completion of a traffic management study according to the Municipal Class Environmental Assessment planning process. It outlines several traffic improvement measures to address transportation problems throughout the neighbourhood. The document was approved by City Council in 2007 and by the Ontario Municipal Board in 2012 (City of Hamilton, 2015a).
3. ***Hamilton Downtown Mobility Street Master Plan***: Developed in 2003, this plan implements the policies of the Urban Hamilton Official Plan with respect to streets (City of Hamilton, 2015a), and establishes a vision, action plan and guidelines to improve the public realm of the subject streets (City of Hamilton, 2003). The plan applies to Bay Street North, John Street North, and James Street North which are major mobility streets in the neighbourhood.
4. ***Jamesville Neighbourhood Action Plan***: This Community Plan developed in 2012 encompasses the North End and Central neighbourhoods. The document provides resident-identified actions to enhance the community.

I completed a descriptive qualitative content analysis of each document to assess the degree to which their policies and guidelines align with the criteria for child-friendly neighbourhoods identified during the literature review and key informant interviews. According to Hoggart et al. (2002), this method of analysis requires developing a “coding system to enable the investigator to draw together material on the same topic and explore similar themes from a

variety of sources” (p. 148). I began by developing categories, or a coding system informed by the literature review and key informant interviews, and compiled these categories in a coding guide (attached as Appendix E). I identified six analytic categories, which are consistent with those considered in the neighbourhood audit: density, service proximity, land use mix, street connectivity, streetscape characteristics, and parking. I then assessed each document by means of classifying the material according to these analytic categories (Flick, von Kardorff, & Steinke, 2004). The objective of this analytic strategy was to assess the degree to which the policies and guidelines found within the documents align with the elements of child-friendly neighbourhoods.

3.4 Limitations

There are several methodological limitations inherent in the present research that must be considered. First, although the literature review, document review and neighbourhood audit provide sufficient information to complete the analyses and provide a set of recommendations for the North End neighbourhood, this research would have benefitted from a greater number of key informant interviews. I distributed a recruitment email to staff within the Planning and Economic Development and Public Health departments; however, I received minimal response. Interviews with additional key informants would further supplement and verify the information gathered from the literature review phase of this study.

Second, the observational nature of this research may make the study vulnerable to bias. I employed a data triangulation technique to minimize researcher bias, which ensured that my point of view was not the only perspective considered. According to Yin (2003), construct validity, defined as “the accuracy with which a case study’s measures reflect the concepts being

studied” (p. 238), is important to the quality of a case study research design. Using multiple sources of evidence is a tactic to increase construct validity in case study research. Accordingly, this study triangulates its data sources by including a literature review, key informant interviews, neighbourhood audit, and document analysis. However, given the nature of the topic studied, this research would have benefited from the participation of children and parents to elicit their perspectives on the opportunities and barriers to children’s physical activity in the study area.

Finally, the scope of the work was limited to a single case study. At the research proposal submission phase of this paper, an objective of the research was to evaluate the child-friendliness of Hamilton overall, given that the City’s vision is to be the best place to raise a child. This would have involved a comprehensive assessment of the planning framework that impacts land use and development within the entire municipality. However, I chose to implement a single case study approach with a neighbourhood as the case unit given the constraints of the study timeline. The North End is promoted as a Child and Family Friendly Neighbourhood, therefore this approach still enabled me to assess the extent to which this statement of child-friendliness is true; however, the findings from this research cannot be generalized the City overall.

3.5 Ethical Considerations

The FES Research Committee approved the study component that involved human participants. Following this approval, the research methodology was revised to add the neighbourhood audit component. However, since this method seeks to evaluate the built

environment, and therefore, does not involve human participants, ethical approval was not required.

Chapter 4: Neighbourhood Audit

The purpose of this chapter is to describe the findings from the neighbourhood audit component of the analyses. To conduct the audit, I completed a structured rating tool with several criteria representing six elements of child-friendly neighbourhoods. Findings from the neighbourhood audit indicate that the North End features many attributes that provide opportunities for children's physical activity. Accordingly, the neighbourhood performed well in most analytic categories and received an overall score of 47 out of 69, which represents the extent to which the neighbourhood is child-friendly. To supplement and provide greater context for this score, a qualitative description of each analytic category informed by the researcher's observations is provided below.

4.1. Density

Density is an important determinant of children's physical activity. Children and youth living in dense and compact neighbourhoods are likely to be within walking or cycling distance of destinations that they visit often, which results in more opportunities for active transportation when compared with low density neighbourhoods wherein there are large distances between residential areas and other destinations (Giles-Corti, et al., 2009; Gleeson & Sipe, 2006). With respect to density, the North End neighbourhood received a score of 1 out of a possible 2 (refer to Table 1).⁴ While the North End features some multi-story apartment buildings, the density of the neighbourhood is primarily characterized by detached buildings in the form of single-family dwellings. However, it is important to note that there is very little

⁴ For the purpose of this neighbourhood audit, density refers to the perceived ratio of building structures to an area.

unused space between buildings; they are typically constructed close to one another and to sidewalks, which may help to reduce travel distances to local destinations. Therefore, despite not receiving a full score for this element, the density of the North End is not likely to impact its child-friendliness overall.

Table 1 Scores for Density

Question	Scoring System	Score
1. The density of the neighbourhood is characterized by:	0 = A few single businesses/institutions or single detached homes with large yards 1 = Some multi-story units but mostly detached buildings 2 = A high number of closely constructed and/or multi-storey buildings with little unused space	1
Total =		1/2

4.2 Service Proximity

Service proximity has a significant influence on whether children choose active or passive modes of travel. Destinations must be a walkable distance from residential areas to encourage walking and cycling over driving. Proximity to children's destinations including recreational space (de Vries et al., 2007; Duncan et al., 2014; van Loon et al., 2014), elementary and secondary schools (van Loon et al., 2014; Oreskovic et al., 2009), retail (Oliver et al., 2015), social and cultural services (Oliver et al., 2015), parks and other play areas (Mitchell et al., 2016; Tappe et al., 2013; van Loon et al., 2014), transit stops, and libraries is particularly important to children's physical activity. The North End was evaluated on whether these services are present and within a walkable distance of most dwellings, receiving a score of 6 out of 9 points (refer to Table 2). While the neighbourhood is predominantly residential, it contains many services within a walkable distance that are important to children and youth.

The neighbourhood features two centrally-located elementary schools, St. Lawrence Catholic Elementary School and Bennetto Elementary School. These institutions are also located close to organizations offering recreational, social, health and community services including Bennetto Recreation Centre and the North Hamilton Community Centre. The North End does not feature a branch location of the municipal library system, the Hamilton Public Library. However, the City's mobile library, the "Bookmobile" visits the Bennetto Recreation Centre weekly, providing residents with access to library collections and services year-round (Hamilton Public Library, 2017). The neighbourhood also contains a number of parks and recreational spaces including Eastwood Park, Jackie Washington Rotary Park, Bayview Park, Bayfront Park, a basketball court at the Jamesville townhouse complex; as well as a basketball court, baseball diamond, and an outdoor playground located in the area around Bennetto Recreation Centre and the North Hamilton Community Health Centre.

The Hamilton waterfront is another significant resource for recreation in the neighbourhood. This area of the neighbourhood contains Bayfront Park, one of the largest parks in the City, Pier 4 park, the Waterfront Trail, and Pier 8 which features a newly redeveloped waterfront trail and outdoor roller/skating rink. There is also a variety of retail amenities, concentrated mostly along major arterial roads, including coffee shops, restaurants, a pharmacy, and convenience stores. Moreover, major roads are serviced by Hamilton Street Railway, with stops every ~400 metres.

It is clear from these observations that the North End is equipped with many services that are important to children's physical activity accumulation. Except for the parks and recreation facilities which are interspersed throughout the neighbourhood, these services are

mostly centrally located and near major roads. Thus services are within a walkable distance of most neighbourhood dwellings and transit stops. The neighbourhood is missing a secondary school, which has been identified in the existing literature as an important service found in child-friendly neighbourhoods. Youth living in the North End attend secondary schools in adjacent neighbourhoods; however, the findings from this neighbourhood audit indicate that they are unlikely to be within a walkable distance of the students' dwellings.

Table 2 Scores for Service Proximity

Question	Scoring System	Score
2. Residential areas are located within a walkable distance of a/an:		
a. Childcare facility or preschool	0 = No 1 = Yes	1
b. Elementary school	0 = No 1 = Yes	1
c. Secondary school	0 = No 1 = Yes	0
d. Public library	0 = No 1 = Yes	0
e. Recreation centre	0 = No 1 = Yes	1
f. Playing field, park, square or natural open space	0 = No 1 = Yes	1
g. Retail amenities	0 = No 1 = Yes	1
3. Are children's destinations located within a walking distance from transit stops (i.e., schools, parks, recreation facilities, etc.)?	0 = No 1 = Somewhat – some children's destinations are within walking distance from a transit stop 2 = Yes – most children's destinations are within walking distance from a transit stop	1
Total =		6/9

4.3 Land Use Mix

Land use mix impacts children’s physical activity by determining the degree to which services and other destinations are accessible within the neighbourhood via an active mode of transportation. In this evaluation, land use mix was measured in terms of the mix of land uses and housing typologies in the neighbourhood (refer to Table 3). The North End received a score of 2 out of 4 points on the land use mix category. Major roads (i.e., James Street North, John Street North and Wellington Street North) include some commercial, institutional, and industrial land uses. However, the neighbourhood is predominantly residential. Zoning maps show that multiple dwellings and commercial land use designations are concentrated along James Street North, and industrial designations in the areas bound by Ferguson Avenue North, Wellington Street North, Burlington Street East and the harbour front.⁵ However, most of the interior of the neighbourhood is zoned for residential uses with one- and two-family dwellings. Accordingly, the housing stock in the North End is dominated by single-family dwellings, therefore the neighbourhood received partial marks on its mix of housing typologies.

Table 3 Scores for Land Use Mix

Question	Scoring System	Score
4. The neighbourhood includes a mix of uses (e.g., residential, commercial, industrial, recreational).	0 = No – the neighbourhood has little to no mix of uses, it is almost entirely dominated by a single use 1 = Somewhat – two to three uses are present but it is dominated by a single use 2 = Yes – the area includes a high and equitable mix of diverse uses	1
5. The neighbourhood includes a variety of housing types (e.g., single-detached, semi-detached and multiplex homes; townhomes;	0 = No – there are only single-detached homes in the neighbourhood 1 = Somewhat – there is a mix of housing types but most homes in the neighbourhood are single-detached	1

⁵ To verify observations on land use, I referenced the City’s interactive zoning mapping interface (City of Hamilton, 2017a) and the *City of Hamilton Zoning By-Law No. 6593*.

and apartment buildings/condominiums).	2 = Yes – there is a diverse range of housing types in the neighbourhood	
	Total =	2/4

4.4 Street Connectivity

High street connectivity is an important characteristic of child-friendly neighbourhoods. Features that are characteristic of high street connectivity such as route directness, a grid-patterned street network and a variety of route options make active travel modes more accessible (Mecredy et al., 2011a). With respect to street connectivity, the North End received a score of 2 out of a possible 2 points (refer to Table 4). The neighbourhood's street layout is in a grid pattern with short block lengths, which contributes positively to the connectivity of the pedestrian network and provides for shorter travel distances between destinations.



Image 1 Traffic filter

I observed a dead-end at Ferrie Street East where the grid network is severed by the rail corridor; however, it did not affect the neighbourhood's score on this category. Pedestrian pathways connecting Ferrie Street East to Wellington Street East to the east and Simcoe Street East/Jackie Washington Rotary Park to the south, and the pedestrian bridge at Mary Street

allow pedestrians and cyclists to pass through areas where the street network is interrupted, thus maintaining connectivity. Similarly, there is a traffic filter on Hughson Street between Guise Street and Brock Street which disrupts vehicular traffic; however, the pedestrian linkages are fully maintained (refer to Image 1). Pathways are also present throughout the North Hamilton Community Health Centre and Bennetto Recreation Centre sites, which helps to maintain the linkages with the walking and cycling network despite their large lot sizes.

Table 4 Scores for Street Connectivity

Question	Scoring System	Score
6. Streets in the neighbourhood are well connected.	0 = No – there are many cul-de-sacs and the streets are designed in a ‘loops and lollipops’ pattern 1 = Somewhat – there is a mix of cul-de-sacs and grid pattern streets 2 = Yes – the streets are in a grid pattern with short blocks	2
	Total =	2/2

4.5 Streetscape Characteristics

Children rely on quality public spaces for their outdoor physical activity.

Neighbourhoods that are built to pedestrian scale and with many amenities are conducive to children’s physical activity by providing a safe, pleasant and engaging environment for walking, cycling and playing. Evaluations in this category considered aesthetics, built form, sidewalk and road characteristics, traffic flow and volume, and traffic calming measures. Based on these criteria, the North End scored 29 out of a possible 44 (refer to Table 5).

4.5.1 Aesthetics

The physical appearance of public spaces has important implications for children’s physical activity. Aesthetic features of child-friendly neighbourhoods include street trees (Tappe et al.,

2013; Larsen et al., 2012; Nelson & Woods, 2009), lighting (City of Surrey, 2010; Enns, 2014; Honey-Ray & Enns, 2009), street furniture (City of Surrey, 2010), wayfinding signage (Alberta Centre for Child, Family and Community Research, 2015; City of Surrey, 2009, 2010), and public art (City of Surrey, 2010). The North End received a score of 6 out of 12 on these aesthetic features of the built environment:

- **Street Trees:** While the neighbourhood has many old growth trees that provide protection from the sun and contribute positively to the aesthetics of the area, the trees and plants are often poorly placed and inconsistent. The researcher noted that some street segments in the neighbourhood were very bare in terms of greenery, particularly along major roads. For example, minimal greenery along Burlington Street North contributes to a feeling of being unprotected from the elements when walking along the street.
- **Lighting:** The neighbourhood has street lights; however, the lights are not to pedestrian scale and spaced quite far apart, except for the lighting around entrances to the harbour front and along multi-use paths throughout Eastwood Park.
- **Street Furniture:** There is an absence of benches and other street furniture along significant pedestrian routes. Street furniture was concentrated in recreational areas, for example, along pathways through Eastwood Park and Pier 8. There are also few opportunities for respite and shelter at transit stops.
- **Wayfinding Signage:** Pedestrians benefit from wayfinding signage, for example, at the north-eastern corner of Burlington Street East and James Street North, indicating the direction to Liuna Station and the Central Library to the south, and the HMCS Haida to the north. Wayfinding signage is also located at SoBi bike share stations. The Eastwood Arena station includes a map displaying the area within a walkable distance of the station and directs cyclists to the nearby Waterfront Trail (refer to Image 2).
- **Public Art:** Public art in the neighbourhood is minimal but, where present, is well placed at significant destinations. For example, at park and recreation areas along the harbour front (refer to Image 3).



Image 2 Wayfinding



Image 3 Public art

4.5.2 Building Characteristics

Buildings in child-friendly neighbourhoods are constructed in a way such that they relate to the human scale, and thus are pleasant to walk around (Larco, Kelsey, & West, 2014; Yates et al., 2016). The North End received full marks for this item on the neighbourhood audit tool. The neighbourhood's pedestrian environments benefit from a human scale built form: most dwellings are located on small lots and with short setbacks, and most retail and service destinations are located linearly along major roads and thus are accessible to pedestrians.

4.5.3 Walking & Cycling Infrastructure

To protect children from vehicular traffic and encourage active modes of travel, child-friendly neighbourhoods often include enhanced infrastructure for walking and cycling (Alberta Centre for Child, Family and Community Research, 2015; Enns, 2014; Gilbert & O'Brien, 2005;

ParticipACTION, 2015). The North End scored high in terms of the presence of sidewalks. Apart from segments along Bay Street North and MacNab Street North, all streets have sidewalks along both sides of the street. However, the neighbourhood received partial marks on the items regarding sidewalks, as the sidewalk width in most areas is inadequate. Sidewalks along most minor roads are about 1.2 metres wide, which can accommodate a stroller or a child on a bike but does not allow any additional space for passing pedestrians. The researcher also observed some connectivity issues with the sidewalks which warranted partial marks for Question 10 on the rating tool. For example, one of the pathways connecting the playground at the Bennetto Recreation Centre is misaligned with the curb cut which may make it difficult for strollers, bicycles and mobility devices to access the sidewalk.

With respect to cycling infrastructure, the neighbourhood received a score of 4 out of 6. The neighbourhood has a bicycle route along Ferguson Avenue North that connects to the Waterfront Trail, and a multi-use trail that runs adjacent to the railway tracks. However, no marks were given for item 19: 'are there dedicated bike lanes in the neighbourhood?'. Moreover, majority of the Ferguson Avenue North bike route, particularly the section south of Burlington Street East, is marked only by signs and does not include sharrows. Therefore, there is no clear division between the road and bicycle lane.

4.5.4 Traffic Calming Measures

Child-friendly neighbourhoods are designed to prioritize pedestrians and cyclists over vehicular movement. Traffic calming measures are an integral feature of child-friendly neighbourhoods as they protect active transportation routes (Alberta Centre for Child, Family and Community Research, 2015; Enns, 2014; Gilbert & O'Brien, 2005; ParticipACTION, 2015).

The North End features several traffic calming measures, including reduced traffic speeds, curb extensions (refer to Image 4), signalized pedestrian crossings with auditory and visual signals at Simcoe Street at James Street North and Picton Street at James Street North, and a traffic filter on Hughson Street between Guise Street and Brock Street which prevents northbound vehicular flow while maintaining pedestrian linkages (refer to Image 1). Major intersections along Burlington Street East and James Street North have controlled crossings, and there are several pedestrian crossings with pavement markings along minor streets. Most sidewalks have some form of buffer protecting pedestrians from vehicular traffic, such as on-street parking or grass strips. The researcher also observed a higher number of traffic calming measures along streets close to children's destinations, including a speed monitoring device on John Street North as vehicles approach the school zone.

The flow and volume of traffic in the North End can be characterized as slow and predictable. The inner residential streets are posted at 30 km/hour and have minimal traffic. Most minor and major streets are two-directional, except for John Street North and Wellington



Image 4 Curb extension

Street North, and all roads have two lanes of traffic, except for Wellington Street North which has three lanes and serves as a major mobility route for large vehicles. Given these conditions, I assigned the neighbourhood a score of 3 out of 4 on the corresponding audit tool items.

Despite these strengths, I noted a number of weaknesses with respect to traffic calming measures. For example, the area where Bay Street North and Leander Drive intersect is hostile to pedestrians and cyclists who are approaching the waterfront from Bay Street North or Bayview Park. This is an area that has a high volume of pedestrians and cyclists, given its proximity to the harbour front and Waterfront Trail, thus the implementation of measures to slow traffic and improve pedestrian visibility would be beneficial. Moreover, two of the major arterial roads, Wellington Street North and Burlington Street East, are inadequate in terms of traffic calming measures. Vehicles travel at higher speeds along these roads, and large vehicles including public transit buses travel close to the sidewalks. There are fewer buffers between the sidewalks and street to protect pedestrians along these major than on minor roads in the neighbourhood. Finally, the pedestrian crossings along these major streets are insufficient. For example, the Ferguson Street North transit stop along Burlington Street East does not have a nearby pedestrian crossing which may force pedestrians to cross unsafely mid-block, particularly during peak traffic hours.

Table 5 Scores for Streetscape Characteristics

Question	Scoring System	Score
7. Are neighbourhood public and retail services located linearly among major roads?	0 = No 1 = Somewhat – some neighbourhood public and retail services are located linearly along major roads 2 = Yes – most neighbourhood public and retail services are located linearly along major roads	2

8. Are buildings oriented close to the sidewalk?	0 = No – many buildings are separated from the sidewalk by parking lots 1 = Somewhat – there are a few buildings separated from the sidewalk by parking lots 2 = Yes – buildings are located immediately adjacent to the sidewalk	1
9. Are there trees and/or other plants present on streets?	0 = No 1 = Somewhat – present but poorly maintained and/or placed 2 = Yes – many well maintained and placed trees/plants present	1
10. All major pedestrian routes have:		
a. Protection from the elements (e.g., awnings, tree canopy, etc.)	0 = No 1 = Some protection from the elements present 2 = Yes – there is ample protection from the elements	1
b. Street furniture (e.g., benches, waste baskets, water fountains, etc.)	0 = No 1 = Some present but poorly located 2 = Yes – there is a variety of properly located street furniture	1
c. Lighting	0 = No 1 = Some 2 = Yes	1
d. Wayfinding and/or pedestrian route information	0 = No 1 = Some 2 = Yes	1
11. Is there public art present in public spaces throughout the neighbourhood?	0 = No 1 = Somewhat – there is public art in some public places 2 = Yes – there is public art in most public spaces	1
12. Are sidewalks present in the neighbourhood?	0 = No 1 = Yes – on one side of the street 2 = Yes – on both sides the street	2
13. Are sidewalks wide enough to accommodate strollers?	0 = No 1 = Yes – in some areas 2 = Yes – in all areas	0
14. Are ramps present at intersections and driveways?	0 = No 1 = Somewhat – present at some intersections and driveways	2

	2 = Yes – present at all intersections and driveways	
15. Is there a buffer between the sidewalk and the road (e.g., a grass strip, trees, on-street parking)?	0 = No 1 = Somewhat – present in some areas 2 = Yes – present in most or all areas	2
16. Street crossings feature amenities including:		
a. Four-way signalized at major intersections	0 = No 1 = Somewhat – some major intersections have four-way signalized pedestrian crossings 2 = Yes – all major intersections have four-way signalized pedestrian crossings	1
b. Bump-outs	0 = No 1 = Somewhat – there are some bump-outs and/or they are ineffectively placed 2 = Yes – there are numerous effectively placed bump-outs	2
c. Non-slip strips	0 = No 1 = Somewhat – some pedestrian crossings feature non-slip strips 2 = Yes – all pedestrian crossings feature non-slip strips	1
d. Auditory signals	0 = No 1 = Somewhat – some pedestrian crossings feature auditory signals 2 = Yes – all pedestrian crossings feature auditory signals	1
e. Visual countdowns	0 = No 1 = Somewhat – there are visual countdowns at some signalized intersections 2 = Yes – there are visual countdowns at all signalized intersections	2
17. What is traffic flow like in the neighbourhood?	0 = Fast and aggressive 1 = Moderate to fast speeds and flow 2 = Slow, calm, predictable	2
18. How many traffic lanes do streets in the neighbourhood have?	0 = Most have >3 lanes 1 = Most have 2-3 lanes 2 = Most have <2 lanes	1
19. Are there dedicated bike lanes in the neighbourhood?	0 = No 1 = Some dedicated bike lanes present	0

	2 = Yes – dedicated bike lanes exist throughout the neighbourhood	
20. Where bicycle routes are present, do they connect to the broader walking/cycling network and to destinations?	0 = bicycle routes end abruptly and/or do not connect to other bicycling/walking routes leading to destinations 1 = Somewhat – bicycle routes end abruptly in some locations and/or are poorly connected 2 = Yes – bicycle routes are continuous and well connected	2
21. Is there adequate signage to mark bicycle routes?	0 = No 1 = Some route signage present but in poor condition or obscured 2 = Yes - all bicycle routes are marked clearly	2
Total =		29/44



Image 5 SoBi bike share station

4.6 Parking

The location and design of parking can have a negative impact on children's physical activity by creating an unwelcoming environment for pedestrians. Surface lots increase distances between destinations and may encourage automobile travel if readily available within a neighbourhood (Dunn et al., 2009), whereas on-street parking calms traffic and creates a barrier between the street and children as pedestrians (de Vries et al., 2007). Thus parking in child-friendly neighbourhood discourages the use of automobiles for transportation by reducing the supply of vehicle parking, and encourage active modes of travel such as walking and cycling by providing bicycle parking. Evaluations in this category considered the presence or absence of the following items: on-street parking, surface parking, bicycle parking, and bike share stations. The North End received a score of 6 out of a possible 8 points on this element (refer to Table 6).

4.6.1 Bicycle Parking

Bicycle parking is located at key destinations in the neighbourhood including Bennetto Elementary School, Bennetto Recreation Centre and the North Hamilton Community Health Centre. There are also numerous conveniently located SoBi stations, the City's local bike share system (refer to Image 5). During the audit, the researcher counted nine bike share stations in the neighbourhood, placed at key locations such as the entrances to the harbour front parks, recreation areas and the Waterfront Trail; the elementary schools and community centres; and close to transit stops (e.g., at the Mary Street North HSR stop along Burlington Street East near Eastwood Park).

4.6.2 Automobile Parking

The North End scored well in terms of automobile parking, receiving 4 out of 4 on the related criteria. All streets in the neighbourhood have on-street parking on one or both sides of

the street. Few homes have driveways, and there are very few surface parking lots in the neighbourhood, which are located mostly at institutions, recreational spaces and in commercial areas. Moreover, most surface parking lots are located to the side or rear of dwellings, or on parcels with buildings constructed close to the street, which encourages pedestrian access.

Table 6 Scores for Parking

Question	Scoring System	Score
22. Is there on-street parking?	0 = No 1 = Yes – along some streets 2 = Yes – along all streets	2
23. Are there surface parking lots present in the neighbourhood?	0 = Yes – there are many large surface parking lots 1 = Yes – there are some surface parking lots 2 = No – there are few or no surface parking lots	2
24. Is there adequate bicycle parking in the neighbourhood?	0 = No 1 = Some – bike racks present but they are poorly located or located in an unsafe location 2 = Yes – there are many conveniently/safely located bike racks	1
25. Are there bike share stations present in the neighbourhood?	0 = No 1 = Yes – some bike share stations but they are poorly located 2 = Yes – there are several conveniently-located bike share stations	2
Total =		7/8

4.7 Summary

In this chapter, I summarized the results from the analyses of the North End's existing built environment, which was guided by a structured rating tool. The criteria considered in this analysis were informed by the elements of child-friendly neighbourhoods identified in the existing literature and in the key informant interviews with City of Hamilton staff. This audit indicates that the North End features many attributes that are conducive to children's physical

activity, therefore the neighbourhood performed well on most analytic categories. However, this audit also identified some neighbourhood attributes that may restrict children's opportunities for physical activity, including a lack of pedestrian infrastructure at some intersections, protected cycling infrastructure, and streetscape amenities; and a fairly homogenous mix of land uses throughout the area. These findings illustrate how the neighbourhood serves the children and youth currently living in the neighbourhood. In the following chapter, I describe how locally specific municipal planning documents might impact the future neighbourhood. Following this, I discuss how these guiding documents may address some of the barriers identified in the neighbourhood audit in the concluding chapter of this paper.

Chapter 5: Document Analysis

In this chapter, I describe the analysis of the *West Harbour Setting Sail Secondary Plan*, the *North End Traffic Management Plan*, the *Downtown Mobility Street Master Plan*, and the *Jamesville Neighbourhood Action Plan*.⁶ The purpose of this analysis is to identify possible opportunities and barriers to achieving a child-friendly neighbourhood in the North End within the existing municipal planning framework. Each document has been reviewed in the context of the elements of the built environment associated with children's physical activity, and analysis was based on a set of predetermined criteria informed by the literature review and semi-structured interviews with key informants.

5.1 Density

Setting Sail defines density primarily in terms of the number of people and jobs per area. The document sets out the density that should be accommodated through development that occurs within low, medium and high density residential, and mixed-use areas. Density targets progressively increase from low to high density designated areas. Accordingly, the areas that are shown on Schedule M-2 of the document as Low Density Residential are destined to remain one- and two-family dwelling areas (refer to Appendix F). The Plan also prioritizes the protection and enhancement of the character of the existing neighbourhood, which has an impact on the density of future development. Policy A.6.3.2.2 indicates that "As changes in West Harbour continue, both on the waterfront and in the neighbourhoods, it is important to...ensure new development respects and enhances the character of the neighbourhoods" (p.

⁶ *City of Hamilton Zoning By-Law No. 6593* was used to support the analysis of *Setting Sail* and to clarify information presented in the Secondary Plan pertaining to zoning and land use designations.

3). Moreover, section A.6.3.3.4.1 indicates that the design, scale, massing, setbacks, and height of new development shall respect that of the existing buildings in the neighbourhood.

Given that most of the North End is designated as Low Density Residential, and there is a clear objective to maintain the character of the area, it is evident that the density of the future neighbourhood will mostly resemble that of the present neighbourhood.⁷ The existing literature suggests that compact density is more conducive to child-friendly environments than low density development (Giles-Corti et al., 2009; Oliver et al., 2011, 2016). According to these standards, *Setting Sail* does not meet the criteria for this element of child-friendly neighbourhoods. However, while most of the area is zoned for Low Density Residential land use, the policies set out in the document which seek to maintain the character of the existing neighbourhood's built form would result in development that is more characteristic of compact urban neighbourhoods than low-density suburban neighbourhoods, which are linked with poor physical activity outcomes for children and youth (Duncan et al., 2014). Therefore, environments that are conducive to children's physical activity in this case may not be achieved entirely through the dwelling unit density targets, but also require attention to the standards that determine the design and intensity of building development to create walkable environments.

5.2 Service Proximity

Provision of retail, community and recreation services within the neighbourhood is an important feature of *Setting Sail*. Policy A.6.3.2.2 directs planners to encourage new

⁷ Except for areas that are subject to intensification such as Pier 8 and in the lands designated as Mixed-Use, Medium Density Residential, and High Density Residential (refer to Schedule M-2 attached as Appendix F).

commercial uses that cater to the local neighbourhood and to ensure that the existing and future neighbourhood are well served by community services (e.g., schools, healthcare, libraries, and emergency services). While the document does not address the *proximity* from dwellings to these services directly, *Setting Sail* does so indirectly by suggesting that services must be accessible via active travel. For example, the Plan emphasizes that *commercial areas* should be accessible from the surrounding neighbourhood by a range of transportation modes including sustainable and active transportation (s.A.6.3.3.1.16.1.11).

While majority of the neighbourhood is zoned for residential development, the Secondary Plan designates areas adjacent to major roads as Mixed Use, particularly along James Street North. Therefore, services are located linearly along major mobility routes, forming a main street environment. Moreover, lands within the centre of the neighbourhood are designated as Institutional. Institutional uses “mean designed, adapted or used for medical, surgical, charitable or other treatment or care of persons, or for detaining persons for correctional, disciplinary or other purpose” (City of Hamilton, 2015, p. 2-8); and include “hospitals, nursing homes, day nurseries, schools, libraries, museums, places of worship and social services” (City of Hamilton, 2012, p. 20). Accordingly, amenities that children visit frequently are planned to be located within a walkable distance of most dwellings within the neighbourhood.

The Secondary Plan also includes a policy directing planners to continue to provide convenient public transit to existing and future development. Section A.6.3.3.5.1 indicates that “it is the City’s goal to ensure that most dwelling units are within 400 metres walking distance of a transit stop, where permitted by the built pedestrian environment” (City of Hamilton,

2012, p. 29). Proximity to a public transit stop has been shown to be significantly associated with children's physical activity. For example, children of parents who perceived the closest bus or Metro train stop to be longer than 5 minutes from home (about a 400 metre walk) were significantly less likely to meet daily physical activity recommendations (Roberts et al., 2016). Therefore, the policy regarding transit stop provision set out in *Setting Sail* is conducive to children's physical activity by promoting a walkable distance from home to transit.

5.3 Land Use Mix

As discussed above, *Setting Sail* seeks to protect the character of the area as a primarily residential neighbourhood. Single-use neighbourhoods are generally not conducive to children's physical activity, as a lack of land use mix is associated with poor walkability (Laxer & Jannsen, 2013). However, Schedule M-2 of the document indicates that the North End neighbourhood is zoned for a variety of land uses apart from residential including institutional, mixed use, retail, recreational, open space, and some industrial. There are also specific policies that direct planners to encourage new commercial uses that cater to the neighbourhood (s.A.6.3.2.2) and ground-floor commercial and/or community uses in apartments located in Mixed Use areas (s.A.6.3.3.1.17) that contribute to the diversity of land uses. By creating environments wherein residential areas are near complementary land uses, these policies provide for a walkable neighbourhood that is facilitative of children's physical activity.

The Secondary Plan also encourages a variety of housing typologies in the neighbourhood; according to section A.6.3.3.1.9, "[the planning area] shall accommodate a diversity of housing types, including detached and semi-detached dwellings, and multiple dwellings" (City of Hamilton, 2012, p. 9). Despite this policy, majority of land in the North End is

zoned for Low Density Residential development. According to the City of Hamilton Zoning By-Laws (2015), only one and two family dwellings are permitted in this land use classification [s.17B(1)(h)] thereby limiting the housing mix within these areas. However, land use designations specified in the Plan demonstrate that other areas zoned for Mixed Use and Medium/High Density Residential, wherein multiple dwellings, townhouses and apartment buildings may be permitted contribute to the mix of housing typologies within the neighbourhood overall.

5.4 Street Connectivity

Several *Setting Sail Secondary Plan* policies provide guidance to planners to respect the existing grid-based pattern of streets, blocks and open spaces. This pattern contributes positively to children's physical activity by making it easier for them to walk or cycle between destinations via route directness and shorter route options (Mecredy et al., 2011a). The Plan identifies several measures intended to preserve the grid pattern and improve pedestrian, cycling and vehicular mobility including eliminating dead ends where possible, and requiring new public streets through large redevelopment sites (s.A.6.3.3.2.3).

The *Downtown Mobility Street Master Plan* identifies streets as an integral component of the public realm. Improving street linkages was conveyed not only as a way to create shorter distances between home and everyday destinations, but also as a measure to strengthen the City's open space network; thus, streets perform as "both a place and linkage" (p. 3). According to the Master Plan:

Successful cities have a highly developed and connected public realm consisting of a linked network of parks, streets, private open spaces, natural areas, trails and regional recreational destinations...To achieve a connected public realm, streets must be more

than traffic arteries - they must be considered a vital component of the city's open space network. (City of Hamilton, 2003, p. 3)

The *Downtown Mobility Street Master Plan* Linkage Strategy seeks to create an aesthetically pleasing and connected public realm by 're-positioning' streets as an integral part of Hamilton's overall open space network. The components of this Master Plan and *Setting Sail* contribute positively to the Street Connectivity element of child-friendly neighbourhoods by encouraging new development to continue with the existing pattern of short blocks with a grid-pattern street network, and by ensuring that the routes used to travel between destinations are connected, attractive and inviting to pedestrians. These measures are also intended to avoid auto-oriented development patterns that have been shown to result in the 'cul-de-sac kid' phenomenon mentioned previously in this paper.

5.5 Streetscape

The physical appearance and built form of the public realm is important to children's outdoor physical activity. Like the neighbourhood evaluation presented in the previous chapter, the document analysis of the Streetscape element of the neighbourhood built environment considered aesthetics, building characteristics, walking and cycling infrastructure, and traffic calming measures.

5.5.1 Aesthetics

- **Street Trees:** The documents identify street trees and landscaping as a measure to enhance the aesthetic quality of the public realm and to protect pedestrians from vehicular traffic, for example, by spatially defining the pedestrian environment from the vehicular realm (City of Hamilton, 2003). Greening the streets is a primary objective of the Open Space Linkage strategy of the *Downtown Mobility Street Master Plan*, to be achieved through extensive tree planting within the neighbourhood. *Setting Sail* policies provide direction to planners to implement landscaping along all streets (s.A.6.3.3.2.8) and additional trees and landscaping features along primary and neighbourhood

mobility streets (s.A.6.3.3.2.6). Moreover, urban gardening in the form of trees, flower and vegetable gardens was also suggested as a measure to beautify the neighbourhood in the *Neighbourhood Action Plan* (Goal 2, Objective 2, Action 3).

- **Lighting:** Lighting along mobility routes is important to enhance the streetscape and improve visual access and safety of pedestrians. Sections A.6.3.3.2.6 and A.6.3.3.2.8 of the *Setting Sail Secondary Plan* provide direction to City staff to provide lighting along streets. Lighting is also suggested as a measure to achieve the *Downtown Mobility Street Master Plan* principles, Movement and Pedestrian Priority and Open Space Linkage. With respect to the design of lighting, the *Downtown Mobility Street Master Plan* indicates that lighting should be decorative, pedestrian scale, and oriented in a consistent line or on either side of the pedestrian pathway.
- **Street Furniture:** Street furniture provides respite and shelter for pedestrians along mobility routes. Section A.6.3.3.2.8 of *Setting Sail* provides direction to planners to implement transit shelters and seating areas along streets. Similarly, the *Downtown Mobility Street Master Plan* identifies the provision of street furnishings as a measure to support the development of a continuous pedestrian environment. Local residents also identified street furnishings as an important feature of walkable built environments that they would like to see implemented in the Jamesville planning area, including benches, garbage and recycling receptacles, water fountains, and water bottle refill stations (City of Hamilton, 2013).
- **Wayfinding Signage:** Wayfinding signage is important to children's physical activity as this feature helps them to navigate their neighbourhoods independently (City of Surrey, 2009). Section A.6.3.3.2.8 of *Setting Sail* identifies the implementation of a signage system as a measure to improve the comfort and safety of pedestrians in the public realm. Area-wide directional signage is also a key component of the recommended *North End Traffic Management Plan*. Section 6.2.3 of the recommended plan states that directional signage would be installed to promote the use of Wellington Street and Victoria Street as the main vehicular routes to and from the downtown area and from nearby arterial roads. I believe that a purpose of this measure is to direct traffic away from neighbourhood streets which serve as major pedestrian routes. Finally, Objective 1, Action 7 of the Transportation and Accessibility goal stated in the *Jamesville Neighbourhood Action Plan* identifies an Urban Wayfinding network with signs that provide walking directions, travel times and distances as a strategy to encourage walkability.
- **Public Art:** Neighbourhood residents identified public art as a key component of the neighbourhood culture. Objective 2 Action 3 of the 'Safe and Healthy Environments' goal presented in the *Neighbourhood Action Plan* aims to beautify the neighbourhood by implementing more public art, and provides direction to City staff to allow and commission more public art. Similarly, section 6.2.5 of the *North End Traffic*

Management Plan recommends the introduction of public art into traffic calming measures at neighbourhood entrances.

5.5.2 Building Characteristics

As I mentioned in the previous chapter, building forms that relate to the human scale are characteristic of child-friendly neighbourhoods (Larco et al., 2014; Yates et al., 2016). *Setting Sail* includes policies pertaining to the built form that contribute to human scale development. For example, section A.6.3.3.4.1 of *Setting Sail* provides direction to planners regarding the design of buildings, and states that new or re-development shall respect the scale, massing and setbacks of neighbourhood buildings. As Section 3.5.2 in the previous chapter explains, majority of buildings in the North End are constructed to human scale, which sets an important precedent for future development.

In addition to building massing and orientation, this document analysis considered the façades of buildings. The existing literature suggests that the design of building façades can impact the safety of pedestrian environments (City of Surrey, 2010; Enns, 2014). Section A.6.3.3.1.18 of the *Setting Sail Secondary Plan* states that the ground floors of all buildings in Prime Retail areas “shall have windows and doors opening onto the street to provide ‘eyes on the street’ and an interesting pedestrian experience” (City of Hamilton, 2012, p. 19). Integration of “eyes on the street” mechanisms into the design of building façades can facilitate natural forms of surveillance of outdoor spaces (CPTED Ontario, 2014), which is important to children’s safety in the public realm.

5.5.3 Walking & Cycling Infrastructure

All documents reviewed in this analysis include provisions regarding walking and cycling infrastructure, to promote a safe pedestrian environment and encourage active modes of transportation. *Setting Sail* states that a balanced multi-modal transportation network, including efficient routes for walking and cycling are to be provided in the West Harbour (s.A.6.3.4.1.4). Section A.6.3.3.2.8 states that sidewalks should be designed appropriately to provide a safe and comfortable pedestrian environment, and section A.6.3.3.2.6 indicates that Primary and Neighbourhood Mobility Streets may be subject to sidewalk widenings to enhance the streetscape. Sidewalks and walkways are also identified as an important feature of a continuous pedestrian environment in the *Downtown Mobility Street Master Plan*. Principles 5 and 11 of the Movement and Pedestrian Priority strategy of the *Downtown Mobility Street Master Plan* propose that over-built areas can be returned to the pedestrian realm, and vehicular traffic can be slowed by widening sidewalks.

Residents of the Jamesville planning area identify several measures to improve the cycling infrastructure in the *Neighbourhood Action Plan*, including the provision of separated bicycle lanes, on-street bicycle parking, and wider sidewalks (particularly on arterial streets). The *North End Traffic Management Plan* also includes specific measures pertaining to cycling infrastructure; section 6.2.2 of the recommended plan provides direction to planners to implement on-street bicycle lanes on Ferguson Avenue⁸, Guise Street and Bay Street; and proposes an off-street bicycle trail south of Strachan Street along Ferguson Avenue/Dock Service Road.

⁸ A cycling route on Ferguson Avenue has since been implemented, as described in Section 3.5.3 of the previous chapter.

5.5.4 Traffic Calming Measures

Traffic calming measures are an integral component of child-friendly neighbourhoods, as these features of the built environment protect children from vehicular traffic and promote active modes of travel. The *Jamesville Neighbourhood Action Plan* identifies pedestrian crossings (e.g., yellow yield lights and push-button crossings) as a possible measure to achieve the ‘Improve Streets and Encourage Other Modes of Transportation’ principle of the Plan’s goal regarding Transportation and Accessibility. The ‘Movement and Pedestrian Priority’ principle of the *Downtown Pedestrian Mobility Street Master Plan* also suggests the provision of pedestrian crossings, in addition to speed bumps and traffic tables. Moreover, the Master Plan recommends that these measures be implemented in *pedestrian priority areas* including Bay Street from Bayfront Park through the neighbourhood and the North End School Precinct on both sides of John Street – destinations that children visit often.

The *North End Traffic Management Plan* also includes several measures for calming automobile traffic within the neighbourhood such as speed limit reductions to 30 km/h on all neighbourhood streets, full and partial road closures, lane narrowings at key neighbourhood entry points, conversion of one-way to two-way streets, a roundabout at the James Street North and Strachan Street East intersection, a series of curb extensions and chokers, and enhanced pedestrian crossing facilities. As specified in the Plan, many of these measures are proposed to prevent outside vehicles from cutting through the neighbourhood at high speeds to access the major recreational spaces. Similarly, section 6.2.5 of the *North End Traffic Management Plan* recommends the introduction of public art into traffic calming measures at neighbourhood entrances to slow vehicles entering the North End.

5.6 Parking

All documents considered in this analysis identify on-street parking as a measure to slow and manage traffic. Guideline 10 of the *Downtown Mobility Street Master Plan* ‘movement and pedestrian priority’ principle provides direction to City staff to implement on-street parallel parking one or both sides of the street. Section 6.2.2 of the *North End Traffic Management Plan* proposes additional on-street parking along Burlington Street between Ferguson Avenue and Mary Street to reduce the available road width and consequently reduce traffic speeds, a measure which has since been implemented. Finally, *Setting Sail* indicates on-street parking on local streets to prioritize ‘pedestrian movement over traffic movement’ (s.A.6.3.3.2.4).

Setting Sail also provides guidance to planners regarding the location and design of parking areas in the neighbourhood. The Secondary Plan prioritizes streetscape quality and minimizes the impact of parking on pedestrians by requiring parking to be located at the rear of buildings, underground and/or in above-grade structures in Medium Density Residential and commercial areas (s.A.6.3.3.1.13, s.A.6.3.3.1.14, s.A.6.3.3.1.16.1.17). Front yard parking is not permitted in Mixed Use areas (s.A.6.3.3.1.17), and where feasible, it is required that garages and parking be located to the rear of the property in Low Residential areas (s.A.6.3.3.1.16.3.10). Surface parking is generally not permitted in the planning area, except for institutional uses including schools and places of worship. However, the plan indicates that “Institutional uses...shall minimize the size of surface parking areas and landscape the edges of parking areas adjacent to public streets and residential areas” (s.A.6.3.7.1.5, p. 48) thereby minimizing the aesthetic impact on the streetscape and promoting the safety of pedestrians walking through these areas.

With respect to bicycle parking, the documents prioritize modal shift towards active and sustainable modes of transportation, including cycling. Accordingly, they aim to create improved environments for cyclists by providing bicycle parking. Section A.6.3.3.2.6 of *Setting Sail* indicates improved bicycle facilities as a possible streetscape enhancement for Primary Mobility Streets and Neighbourhood Mobility Streets. Similarly, the ‘Movement and Pedestrian Priority’ principle of the *Downtown Mobility Street Master Plan* provides direction to planners to include bicycle stands as a streetscape element. For commercial streetscapes, “bicycle racks should be provided at strategic intersections of the downtown and near entrances to major civic amenities” (City of Hamilton, 2003, p. 12).

5.7 Summary

This chapter describes the results from an analysis of the locally focused municipal planning documents that guide land use and development in the North End. In this stage of analysis, I extracted the content from each document and organized it to align with the six elements of child-friendly built neighbourhood environments identified in the literature review. The following chapter interprets the findings from this analysis in greater detail to identify possible opportunities and challenges to achieving a child-friendly North End according to the content found in these documents. In this concluding chapter, I also compare these findings with those gathered from the neighbourhood audit to determine the extent to which the planning policies and guidelines address or do not address the negative elements of the existing neighbourhood built environment, and provide recommendations to strengthen the child-friendliness of the neighbourhood overall.

Chapter 6: Discussion & Conclusion

This paper provided an analysis of the child-friendliness of the North End neighbourhood in Hamilton, Ontario. The City of Hamilton envisions the municipality to be the best place to raise a child and age successfully. While the most recent census demonstrates a decline in the number of children living in Hamilton since 2011 (Statistics Canada, 2017), recent population projections suggest that this decline will end, and the City will see a 10-25% increase in the number of children between 2016 and 2041 (Ontario Ministry of Finance, 2017). It is important to consider how the City serves the needs of its current and future children so that it can provide a community that is attractive to families. However, the findings from this study suggest that there may be gaps that need to be filled to create the ideal conditions where children are raised.

I selected the North End as a case study for this analysis because a significant portion of its residents are children and youth, and the neighbourhood has a higher proportion of children than the City overall (Statistics Canada, 2012). The neighbourhood is also expected to grow significantly with the development of the Pier 8 lands, therefore this research seeks to evaluate how the North End is currently serving the needs of the children living in the area, and how it will serve the needs of its future young residents as it continues to grow. Moreover, the neighbourhood is also promoted as “Child and Family-Friendly”, as part of Hamilton’s vision to be the best place to raise a child. In this research, I consider the extent to which this statement is true with respect to the neighbourhood’s physical environment, by evaluating the opportunities and challenges to children’s physical activity within the neighbourhood.

To perform this evaluation, I employed two distinct research methods: (1) a neighbourhood audit of the built environment guided by a structured rating tool, and (2) a document analysis of the locally focused municipal planning documents that guide land use and development in the neighbourhood. Previous chapters describe the findings from these analyses. However, the relationship between the findings from these two data sources remains to be assessed. While the neighbourhood audit identified several limitations with respect to the built environment of the current neighbourhood, the policies and guidelines presented in planning documents might help to prevent these negative characteristics from being proliferated in future development. Accordingly, this chapter summarizes the findings from the neighbourhood audit and document analysis, and describes how the municipal planning framework may address or reinforce the limitations identified during the audit. To conclude the paper, I indicate several recommendations to improve the child-friendliness of the North End neighbourhood and provide direction for future research.

6.1 Summary of Research Findings

The first part of this research involved a comprehensive review of literature regarding child-friendly neighbourhoods and children's physical activity. I identified several key elements of child-friendly neighbourhoods from this literature, relating to Density, Land Use Mix, Service Proximity, Street Connectivity, Streetscape, and Parking. Housing was also identified as an important element of child-friendly neighbourhoods; however, the specific features that pertain to child-friendly housing were incorporated into the Land Use Mix, Service Proximity and Density elements of the neighbourhood audit and document analysis. The second part of this research involved interviewing key informants who work in the City of Hamilton Public

Health and Planning and Economic Development departments. I used the information gathered from these interviews and the literature review to develop of a set of analytic criteria on which to assess the existing built environment and the policies and guidelines indicated in the planning documents.

Findings from the neighbourhood audit demonstrate that the North End features many positive affordances for children's physical activity, therefore the neighbourhood performed well in most analytic categories and received a score of 47 out of a possible 69 points. The neighbourhood is characterized by a grid-based street network and human scale built form. Streets include many traffic calming measures including 30 km/h speed limits on neighbourhood streets, which are the first of their kind in the City of Hamilton. The neighbourhood also features many child-specific neighbourhood services including elementary schools, recreation centres, and public transit. These neighbourhood services are conducive to children's physical activity either by offering opportunities for active play or by being located such that they are close to dwellings and as a result, encourage active modes of travel. However, I also observed several barriers: the neighbourhood is predominantly residential, and is characterized by single-detached, one- and two-family dwellings. This composition has contributed to a fairly homogenous mix of land uses in the neighbourhood. Major streets (i.e., Burlington Street East and Wellington Street North) require greater traffic calming particularly near mid-block transit stops, and the connectivity of some streets is interrupted by the railway. Moreover, there are a lack of amenities throughout the neighbourhood that would contribute to an inviting and attractive streetscape environment. Finally, I observed very few surface

parking lots, an abundance of on-street parking which helps to slow traffic, and some bicycle parking located at key destinations.

The second part of the neighbourhood evaluation involved an assessment of the *West Harbour Setting Sail Secondary Plan*, the *North End Traffic Management Plan*, the *Downtown Mobility Street Master Plan*, and the *Jamesville Neighbourhood Action Plan*. The strengths and weaknesses with respect to the child-friendliness of the policies and guidelines presented in these documents are closely aligned with those observed in the neighbourhood audit. There is a clear objective to maintain the character of the area as a primarily residential neighbourhood, which has implications for the density and land use mix of future and re-development. The location of retail, community and recreation services are restricted to mixed-use and commercially-designated areas. The Secondary Plan also encourages a variety of housing typologies in the neighbourhood, including detached and semi-detached dwellings and multiple dwellings. *Setting Sail* and the *Downtown Mobility Street Master Plan* seek to preserve the existing grid-based pattern of streets and small block sizes. Finally, all plans considered in this analysis emphasize the creation of attractive streetscapes and safe streets that prioritize pedestrian safety and mobility over automobile traffic.

These findings may have important implications for the physical activity of the children currently living in the neighbourhood. However, it is also important to consider the interrelationships between the existing built form and the planning documents, as the policies and guidelines contained in these documents will influence the built environment of the future neighbourhood, and as a result, the physical activity of its future child-age residents. The following section describes the challenges and opportunities of the municipal planning

documents considered in this study to creating a child-friendly North End, as they relate to the findings from the neighbourhood audit of the existing built environment.

6.2 Challenges & Opportunities

The existing locally specific municipal planning documents include several policies and guidelines that support child-friendly neighbourhoods, many of which would address the shortcomings of the existing built environment identified in the neighbourhood audit. First, as I mention throughout this paper, the North End is generally characterized by single-detached buildings and is predominantly residential. The existing literature suggests that mono-functional neighbourhoods are not conducive to children's physical activity because they create conditions where children must travel long distances to reach their everyday destinations, thus they are reliant on adults to drive them (Giles-Corti et al., 2009; Gleeson & Sipe, 2006). However, the policies specified in *Setting Sail* seek to maintain the character of the existing built form in the neighbourhood, which is compact with very little unused space and relates to the pedestrian scale. These development patterns are more reflective of walkable neighbourhoods than the sprawling suburban neighbourhoods that proliferate poor physical activity outcomes for children. *Setting Sail* also directs planners to encourage new services that cater to the local neighbourhood and that are accessible via active travel, and to allow ground-floor commercial and/or community uses in apartments in Mixed Use areas. Therefore, while the North End will remain as a primarily residential neighbourhood, most dwellings should be within a walkable distance of services.

The second challenge is the existing housing stock, which includes mostly single-detached dwellings. The majority of land in the neighbourhood is designated for one- and two-

family dwellings, thus limiting the diversity of housing types that is permitted for development. Moreover, since the land zoned for residential land uses is already built-out, additional development within these areas is unlikely to accommodate new housing of a variety of forms and sizes. However, *Setting Sail* encourages a variety of housing typologies within the planning area, including detached and semi-detached dwellings, and multiple dwellings. Lands around James Street North and the harbour front, areas that are subject to growth, are designated as Medium Density Residential or Mixed Use. Therefore, these areas are likely to see the development of new multi-family dwellings, which will contribute to the diversity of housing typologies in the future neighbourhood.

Finally, of the elements considered in the neighbourhood audit, the North End performed most poorly on Streetscape. This element encompassed a range of neighbourhood features including amenities, and walking and cycling infrastructure. First, the North End lacks properly designed and located amenities such as lighting, street furniture, wayfinding signage, and public art. Where present, these amenities are generally concentrated in neighbourhood destinations (i.e., the harbour front), therefore pedestrians do not benefit from them outside of these areas. However, all documents considered in this analysis provide direction to planners to provide these amenities along pedestrian routes to enhance the safety and aesthetic quality of these spaces. Second, sidewalks along most streets are too narrow accommodate a stroller while simultaneously enabling other pedestrians to pass. *Setting Sail* specifies the provision of sidewalk widenings to enhance the pedestrian streetscape, and the *Neighbourhood Action Plan* provides direction to widen sidewalks, particularly on major streets. However, these documents

do not specify minimum widths that would be appropriate to create a comfortable pedestrian environment and protect pedestrians from nearby vehicular traffic.

The neighbourhood also does not feature any protected cycling lanes, and the cycling route that currently runs along Ferguson Avenue North is poorly marked. The *Jamesville Neighbourhood Action Plan* cites the provision of separated bicycle lanes as a measure to improve the cycling infrastructure in the neighbourhood. Similarly, the *North End Traffic Management Plan* provides direction to planners to implement on-street bicycle lanes on Ferguson Avenue, Guise Street and Bay Street.⁹ However, the plan does not specify the use of segregated cycle tracks. Therefore, while the documents seek to strengthen and improve the cycling network in the neighbourhood, the infrastructure identified in these plans does not reflect the current best practice for bicycle lanes (Enns, 2014).

6.3 Recommendations & Concluding Remarks

One of the research questions considered in this study is: how can the North End be planned to be more conducive to children's physical activity? In light of the findings from this research, I provide a number of recommendations with the goal of assisting the City of Hamilton in further promoting the child-friendliness of the North End. The following recommendations reflect issues identified during the neighbourhood audit and document analysis. It is therefore recommended that the City of Hamilton:

- Increase the provision and quality of walking and cycling infrastructure with the intent of increasing the safety and mobility of children as pedestrians. Consider installing more mid-block pedestrian crossings along major roads (i.e., James Street North and Burlington Street East), particularly at transit stop locations; and separated bicycle lanes.

⁹ Some of these cycling routes have been implemented since the Plan was introduced.

- Integrate guidelines presented in the *Jamesville Neighbourhood Action Plan* regarding widened sidewalks into policy. *Setting Sail* states that primary and neighbourhood mobility streets may be subject to sidewalk widenings but does not establish minimum sidewalk widths.
- Implement the policies and guidelines indicated in the planning documents regarding aesthetics and streetscape to improve the quality of the pedestrian realm throughout the neighbourhood.
- Increase the provision of child-specific services including a satellite branch of the Hamilton Public Library.
- Engage the development community to raise awareness of child-friendly planning principles, particularly among developers who have/will purchase lands in the neighbourhood that are subject to growth and large-scale change.
- Develop guidelines for achieving child-friendly neighbourhoods within the Hamilton context. The City has adopted an Age Friendly plan responding to the needs of the latter demographic considered in its vision statement to “be the best place to raise a child and age successfully”. The City’s commitment to achieve their vision of being the best place to raise a child is reflected in its Renewed Charter of Rights of Children and Youth and Active and Sustainable School Transportation Charter, and it is addressed indirectly through several municipal policies and strategies. However, the City would benefit from implementing a focused strategy that addresses the needs of children and youth with a similar framework to that of the Age Friendly plan.

In addition to the recommendations stated above, there are opportunities for further research on this topic. In the present research, I implemented a single-case study approach to narrow the scope of the research so that it could be completed within the limited timeframe of the study. A multiple case approach in further research would allow for a cross-case analysis of various neighbourhoods within Hamilton (Yin, 2003), and for a wider discovering of the research questions overall (Gustafsson, 2017). This research also focused on the physical environment, which is just one component of a child-friendly neighbourhood. Further study would benefit from, for example, an analysis of child-friendly service provision beyond what could be observed at grade-level during the neighbourhood audit in the present research.

Finally, I relied on my own observations to complete the neighbourhood audit which is a potential source of bias. While a structured rating tool with evidence-informed analytic criteria was used to mitigate this bias, adding the perspectives of both children, and adults as the gatekeepers to their independent mobility, would contribute to a more robust assessment of the child-friendliness of the built environment in future research.

In the literature review chapter of this paper, I discuss how the concept of child-friendly cities is underpinned by healthy child and youth development, independent mobility, and sustainability. Applying child-friendly planning principles to land use and development would contribute positively to children's health and development by providing positive affordances for physical activity. These affordances play an important role in parents' decisions to grant their children independent mobility and as a result, the amount of physical activity that they accumulate through active play, walking and cycling throughout their neighbourhoods. However, child-friendly environments benefit more than just children, youth and their families; neighbourhoods that are friendly to children benefit the entire community.

Moreover, the elements of child-friendly neighbourhoods align closely with the principles of urban and social sustainability. Building child-friendly neighbourhoods would promote active modes of transportation and decrease reliance on private automobiles which contributes to air pollution, obesity, and other chronic health conditions. Considering the needs of children and youth in urban planning is also a means to enhance the equity needed for social sustainability, and avoid traditionally paternalistic approaches that have proliferated unhealthy suburban development patterns. Thus, the child-friendly neighbourhood framework provides planners an opportunity to build healthier communities that benefit all residents.

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Appendix A

Interview Guide

1. How is the City's vision to be the 'best place to raise a child' reflected in its planning and/or public health policies and strategies, with respect to the physical environment?
2. Has there been a conscious effort to ensure that the physical environment in Hamilton suits the needs of children, youth and their families?
3. What are the City's strengths and weaknesses with respect to the child- and youth-friendliness of its:
 - a. Land use and density;
 - Proportion of different land uses in a given area.
 - Density can be measured in terms of residential density, service density, etc.
 - b. Service proximity and availability;
 - Distance between where children live and everyday destinations.
 - c. Street connectivity;
 - Route directness and the inter-connectedness of the street network. Includes characteristics such as intersection density, road length, cul-de-sac density and road size.
 - d. Streetscape;
 - The physical appearance of public spaces. Includes aesthetics and built form, and road network and sidewalk characteristics.
 - E.g., amenities, setbacks, scale, traffic calming measures, sidewalk width, etc.
 - e. Parks and open spaces; and,
 - Location, characteristics, design attributes, amenities, etc.

f. Housing.

- E.g., housing type, location and design.

4. Are there aspects of the City's planning and/or public health policies and strategies that are unfriendly to children and youth?
5. What needs to be included in Hamilton's planning and/or public health policies and strategies that would make it a better place for children, youth and their families to live?
6. What do you believe are potential barriers to achieving the City's vision to be the best place to raise a child (e.g., political, economic, physical, etc.)?

Appendix B

Neighbourhood Audit Tool

		Scoring System and Description			
Category	Question	0	1	2	Score
Density	1. The density of the neighbourhood is characterized by:	A few single businesses/institutions or single detached homes with large yards	Some multi-story units but mostly detached buildings	A high number of closely constructed and/or multi-storey buildings with little unused space	1
Total=					1/2
Service Proximity	2. Residential areas are located within a walkable distance of a/an:	-	-	-	-
	a. Childcare facility or preschool	No	Yes	-	1
	b. Elementary school	No	Yes	-	1
	c. Secondary school	No	Yes	-	0
	d. Public library	No	Yes	-	0
	e. Recreation centre	No	Yes	-	1
	f. Playing field, park, square or natural open space	No	Yes	-	1
	g. Retail amenities	No	Yes	-	1
	3. Are children's destinations located within a walking distance from transit stops (i.e., schools, parks, recreation facilities, etc.)?	No	Somewhat – some children's destinations are within walking distance from a transit stop	Yes – most children's destinations are within walking distance from a transit stop	1
Total=					6/9
Land Use & Housing Mix	4. The neighbourhood includes a mix of uses (e.g., residential, commercial, industrial, recreational).	No – the neighbourhood has little to no mix of uses, it is almost entirely dominated by a single use	Somewhat – two to three uses are present but it is dominated by a single use	Yes – the area includes a high and equitable mix of diverse uses	1

	5. The neighbourhood includes a variety of housing types (e.g., single-detached, semi-detached and multiplex homes; townhomes; and apartment buildings/condominiums).	No – there are only single-detached homes in the neighbourhood	Somewhat – there is a mix of housing types but most homes in the neighbourhood are single-detached	Yes – there is a diverse range of housing types in the neighbourhood	1
Total=					2/4
Street Connectivity	6. Streets in the neighbourhood are well connected.	No – there are many cul-de-sacs and the streets are designed in a ‘loops and lollipops’ pattern	Somewhat – there is a mix of cul-de-sacs and grid pattern streets	Yes – the streets are in a grid pattern with short blocks	2
Total=					2/2
Streetscape Characteristics	7. Are neighbourhood public and retail services located linearly among major roads?	No	Somewhat – some neighbourhood public and retail services are located linearly along major roads	Yes – most neighbourhood public and retail services are located linearly along major roads	2
	8. Are buildings oriented close to the sidewalk?	No - many buildings are separated from the sidewalk by parking lots	Somewhat – there are a few buildings separated from the sidewalk by parking lots	Yes – buildings are located immediately adjacent to the sidewalk	1
	9. Are there trees and/or other plants present on streets?	No	Somewhat - present but poorly maintained and/or placed	Yes – many well maintained and placed trees/plants present	1
	10. All major pedestrian routes have:	-	-	-	-
	a. Protection from the elements (e.g., awnings, tree canopy, etc.)	No	Some protection from the elements present	Yes – there is ample protection from the elements	1
	b. Street furniture (e.g., benches, waste baskets, water fountains, etc.)	No	Some present but poorly designed, maintained or located	Yes – there is a variety of properly located street furniture in good condition	1
	c. Lighting	No	Some	Yes	1
	d. Wayfinding and/or pedestrian route information	No	Some	Yes	1

11. Is there public art present in public spaces throughout the neighbourhood?	No	Somewhat – there is public art in some public spaces	Yes – there is public art in most public spaces	1
12. Are sidewalks present in the neighbourhood?	No	Yes – one side	Yes – both sides	2
13. Are sidewalks wide enough to accommodate strollers?	No	Yes – in some areas	Yes – in all areas	0
14. Are ramps present at intersections and driveways?	No	Somewhat - present at some intersections and driveways	Yes – present at all intersections and driveways	2
15. Is there a buffer between the sidewalk and the road (e.g., a grass strip, trees, on-street parking)?	No	Somewhat - present in some areas	Yes - present in most or all areas	2
16. Street crossings feature amenities including:	-	-	-	-
a. Four-way signalized at major intersections	No	Somewhat – some major intersections have four-way signalized pedestrian crossings	Yes – all major intersections have four-way signalized pedestrian crossings	1
b. Bump-outs	No	Somewhat – there are some bump-outs and/or they are ineffectively placed	Yes – there are numerous effectively placed bump-outs	2
c. Non-slip strips	No	Somewhat – some pedestrian crossings feature non-slip strips	Yes – all pedestrian crossings feature non-slip strips	1
d. Auditory signals	No	Somewhat – some pedestrian crossings feature auditory signals	Yes – all pedestrian crossings feature auditory signals	1
e. Visual countdowns	No	Somewhat – there are visual countdowns at some signalized intersections	Yes – there are visual countdowns at all signalized intersections	2
17. What is traffic flow like in the neighbourhood?	Fast and aggressive	Moderate to fast speeds and flow	Slow, calm, predictable	2

	18. How many traffic lanes do streets in the neighbourhood have?	Most have >3 lanes	Most have 2-3 lanes	Most have <2 lanes	1
	19. Are there dedicated bike lanes in the neighbourhood?	No	Some dedicated bike lanes present	Yes – dedicated bike lanes exist throughout the neighbourhood	0
	20. Where bicycle lanes are present, do they connect to the broader walking/cycling network and to destinations?	No – bicycle lanes end abruptly and/or do not connect to other bicycling/walking routes leading to destinations	Somewhat – bicycle lanes end abruptly in some locations and/or are poorly connected	Yes – bicycle lanes are continuous and well connected	2
	21. Is there adequate signage to mark dedicated bicycle lanes?	No	Some route signage present but in poor condition or obscured	Yes – all cycling lanes are marked clearly	2
Total=					29/44
Parking	22. Is there on-street parking?	No	Yes – along some streets	Yes – along all streets	2
	23. Are there surface parking lots present in the neighbourhood?	Yes – there are many large surface parking lots	Yes – there are some surface parking lots	No – there are few or no surface parking lots	2
	24. Is there adequate bicycle parking in the neighbourhood?	No	Some – bike racks present but they are damaged, poorly located or located in an unsafe location	Yes – there are many conveniently/safely located bike racks in good condition	1
	25. Are there bike share stations present in the neighbourhood?	No	Yes – some bike share stations but they are poorly located or frequently empty	Yes – there are several conveniently-located bike share stations with bikes available	2
Total=					7/8
Overall Total=					47/69

Appendix C

Map of the North End Neighbourhood

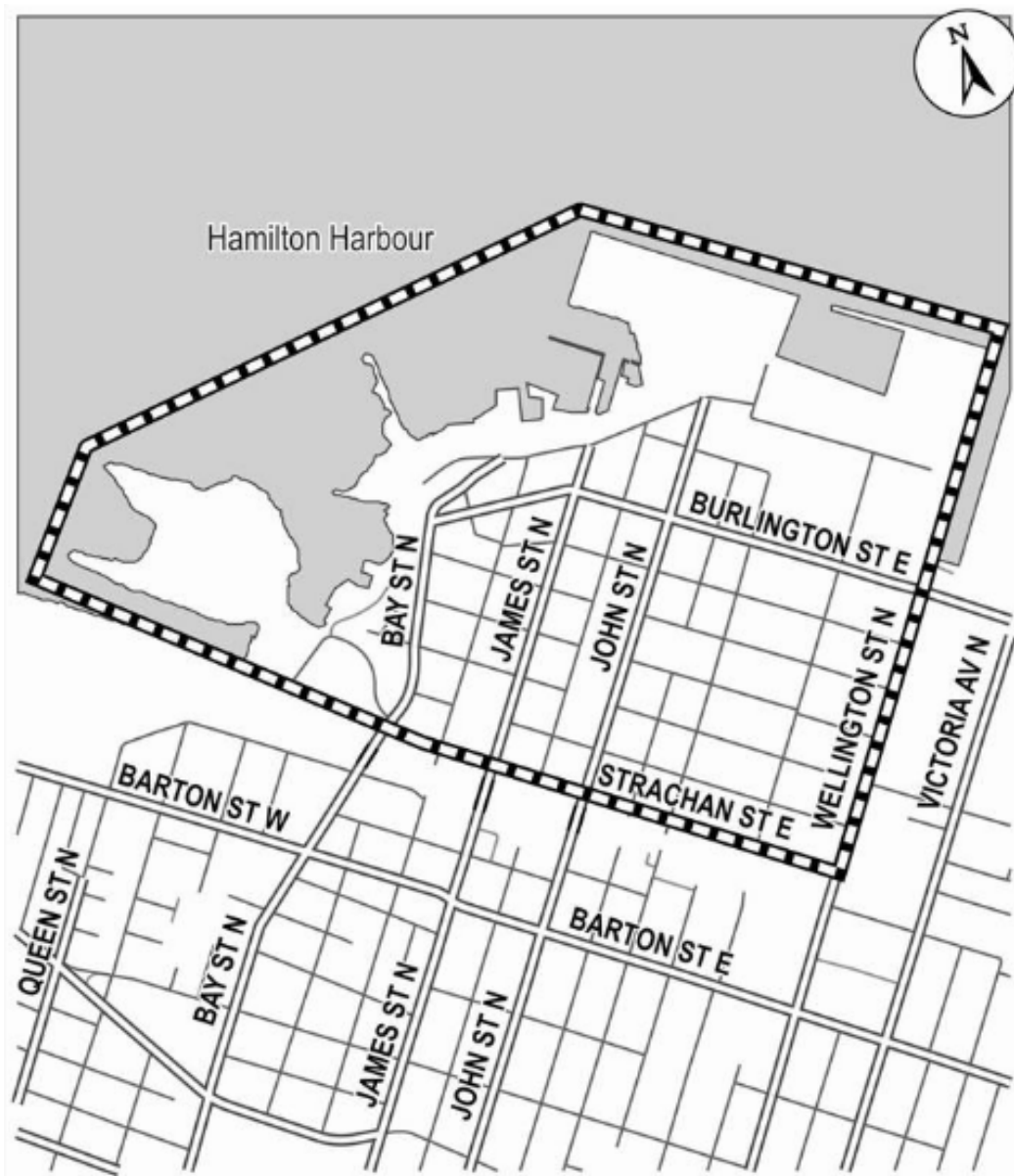


Figure 1. Map of case study area boundaries (City of Hamilton, 2015a)

Neighbourhood Audit Route

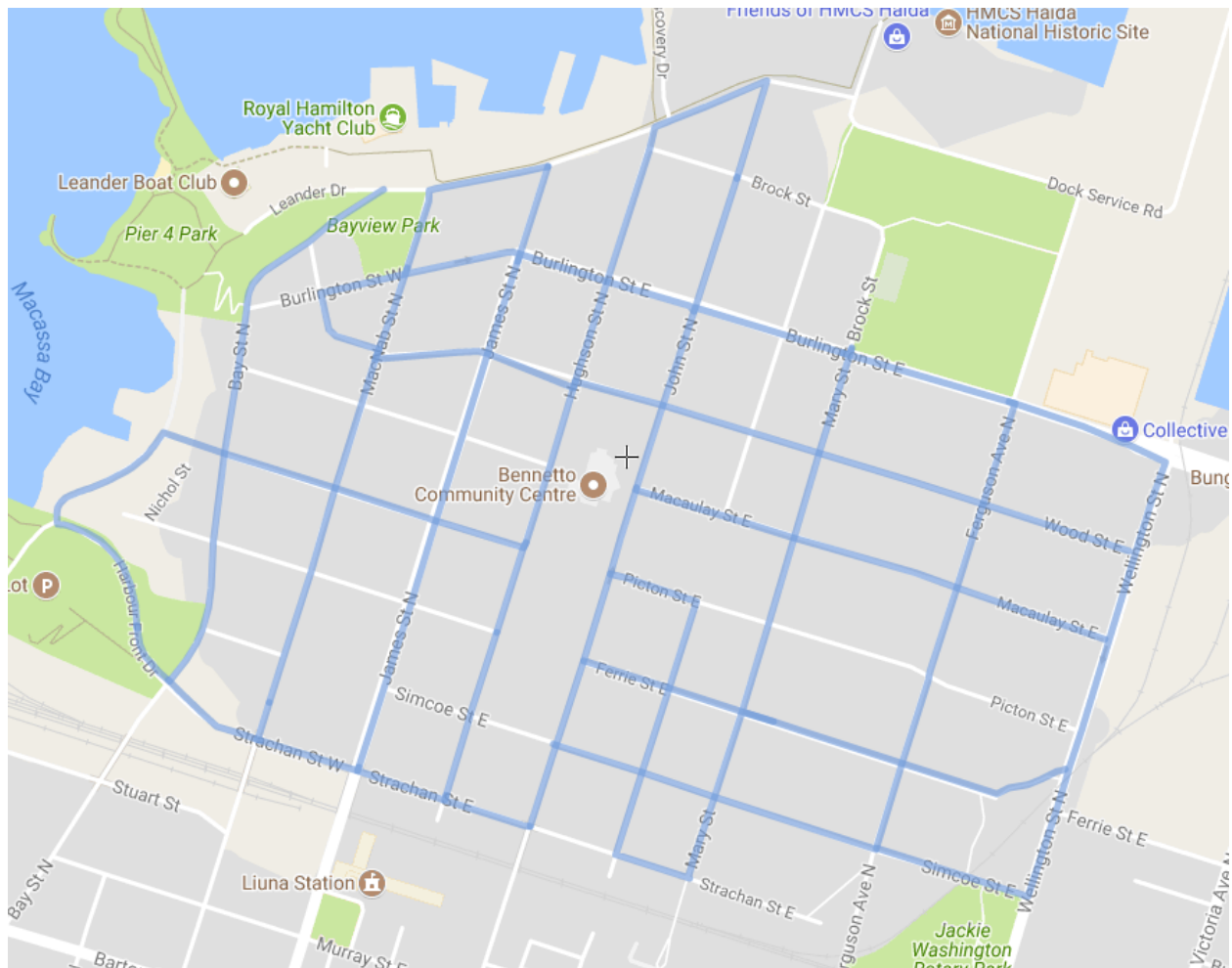


Figure 2. Map of neighbourhood audit route

Appendix E

Document Analysis Criteria

Element(s)	Parameters
Density	Child-friendly density is characterized by: <ul style="list-style-type: none"> • Compact development
Service Proximity	Child-friendly service proximity is characterized by: <ul style="list-style-type: none"> • Residential areas within close proximity of services and destinations such as schools, libraries, public transit, stores, parks, and recreational spaces • Presence of services that are accessible within the neighbourhood using an active mode of transportation
Land Use Mix	Child-friendly land use is characterized by: <ul style="list-style-type: none"> • Mixed-use zoning and development • A variety of housing typologies
Street Connectivity	Child-friendly street connectivity is characterized by: <ul style="list-style-type: none"> • Connected streets • A grid-patterned road network • Small block sizes • A strong and connected network of pedestrian and cycling pathways
Streetscape	A child-friendly streetscape includes and is characterized by: <ul style="list-style-type: none"> • Pedestrian scale development and buildings that are facing and located close to the sidewalk • Amenities including street furniture, public art, lighting and street trees • Protection from the elements • Wide sidewalks to accommodate strollers • Traffic calming measures (e.g., buffer zones, road narrowings, pedestrian crossings, etc.) • Lower traffic speed and volume • Two-way vs. one-way streets • Designated cycling lanes • Prioritization of cyclists and pedestrians at intersections and crossings • Lowered curbs at sidewalk grade or ramps • Direct and safe routes to destinations that children regularly visit (e.g., schools, parks, etc.) • CPTED principles/"eyes on the street"
Parking	Child-friendly parking is characterized by: <ul style="list-style-type: none"> • Minimal surface lots

	<ul style="list-style-type: none"> • On-street parking • Designated carpool/shared use vehicle parking spaces. • Bicycle parking at children's destinations
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Appendix F

North End Land Use Designations

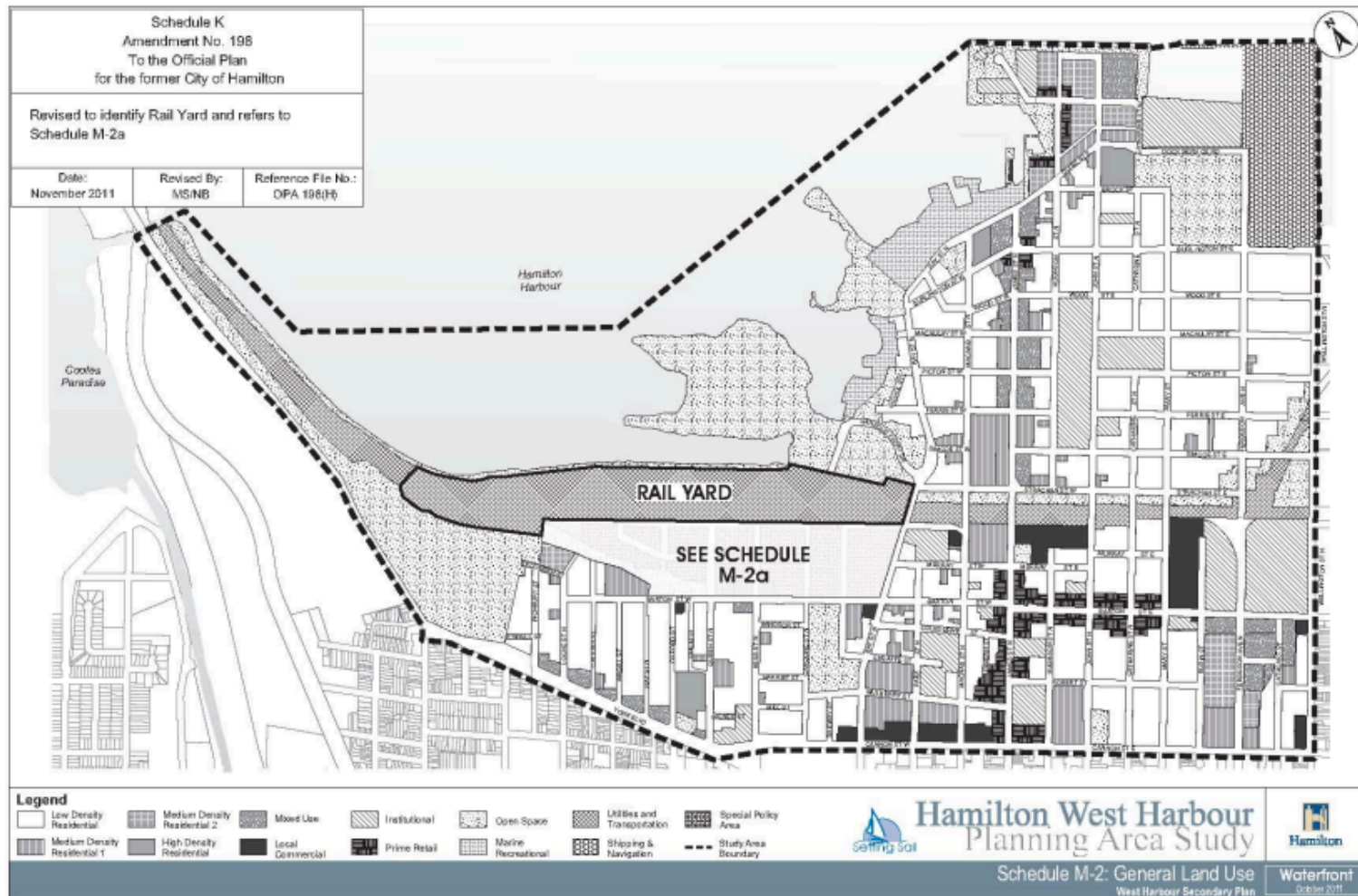


Figure 3. Schedule M-2 General Land Use (City of Hamilton, 2012)

